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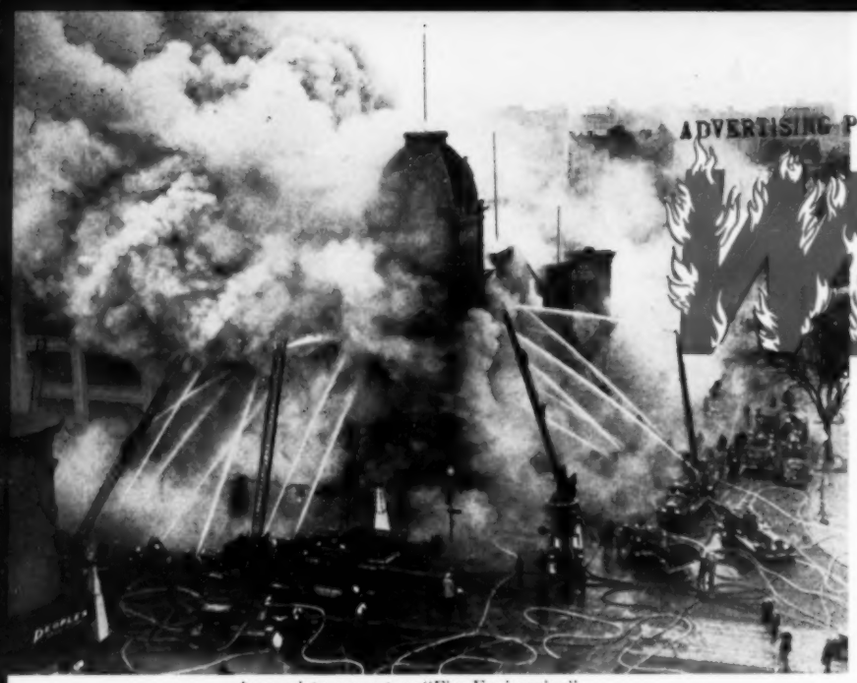

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EDITORIAL

Contributed Greatly Toward Industrial Progress

A COLORFUL career, devoted largely to the interests of American industry during the period of its most glamorous development, came to an end in the passing of John A. Penton.

He was the founder of THE FOUNDRY and of the publishing company bearing his name, one-time editor of some of its publications, a leader in civic enterprises, a patron of the arts, and—denied an extensive formal education for himself—an enthusiastic sponsor for the development of proper education for the generations succeeding his own.

* * *

But all of these diversified interests derived their impetus from an insatiable desire to improve the status of industry. Coming of age in 1883, his active career spanned that great period of lush industrial growth before and after the turn of the century. He was fortunate to have lived at a time when business was going through the metamorphosis from isolated small plants into the complicated, intricate structure that we know today.

And thus he was in on the ground floor of many of the great movements in the organization of industry. The famous Gary dinners, forerunners to the American Iron and Steel institute, thrilled him because in them he saw a trend toward a saner development in iron and steel, following a period of ruthless and destructive competition.

* * *

In the foundry field, which was always close to his heart, he was an active participant in the launching of the American Foundrymen's association, the National Founders' association and other organizations. He played similar roles in the establishment of employers' associations in the metal trades.

* * *

In all of these activities he was practicing his own publishing philosophy, which was that a publisher thrives in proportion to the real service he can render the industries to which his publications cater.

In this respect Mr. Penton was unlike some other eminent business publishers of his day. To many of them, the publishing business was their chief interest. They devoted much attention to the organizations of publishers.

Mr. Penton, on the other hand, never participated actively in the publisher organizations. To him the problems of industry were more fascinating than the problems of publishing. His heart was in the affairs of industrialists, and as a result one finds among the awards of recognition granted him at various times the phrase "counsellor of industry."

* * *

It is an epitaph he prized highly. To those who know the extent of his contributions throughout the years, it is richly deserved.

E. L. Shaner

President
Penton Publishing Co.

JOHN AUGUSTUS PENTON

1862 — 1940

JOHN AUGUSTUS PENTON, chairman of the board of the Penton Publishing Co., Cleveland, and founder of THE FOUNDRY, died Sept. 8 at his home in Santa Barbara, Calif. Mr. Penton was a leader in the fields of both publishing and industry, and for many years devoted his efforts and talents in furthering the welfare and progress of the foundry industry. Several organizations, which today are serving that industry, may trace their origins at least in part to his energy, enthusiasm and ability for organization.

Mr. Penton was born in Paris, Ont., May 12, 1862, the son of Thomas and Anna Penton. His father was a prosperous lumberman conducting yards at Sarnia, Ont., and points along the Great Western railway. Due to business reverses which led to financial losses for the elder Penton, the son was forced to support himself at an early age. After completing a public school education at Sarnia, Mr. Penton learned the trades of machinist and iron molder. He worked at the latter trade for a number of years, and in 1883 moved to Detroit.

From his earliest connection with the molders' trade, he was interested in the activities of the labor organization. He found that the molders' union of that early day was dominated largely by men who were employed in the stove making trades and that those working in the machinery shops had little voice in the activities of the union. Appreciating that inequality, Mr. Penton was active in the founding of the Brotherhood of Machinery Molders, and served as president of that organization from 1886 to 1892. One of the important accomplishments of his term as president was the establishment of a small paper known as the *Machinery Molders' Journal*, which, in addition to news of the trade and union affairs, carried practical and technical pointers for operating molders.

At that time the foundry industry, although one of the oldest in the United States, had no trade or business publication devoted exclusively to its interests. After a careful study of the needs for such a publication, Mr. Penton resigned his union connection and established THE FOUNDRY, a periodical devoted to the technical phases of castings manufacture. The first issue was published in Detroit in September, 1892. From the very beginning, THE FOUNDRY undertook to provide leadership in the improvement of shop operations, efficiency and quality of product.

At that time, small local foundry groups, such as the Western Foundrymen's association, the Philadelphia Foundrymen's association, New England Foundrymen's association, and others, were carrying on technical work. Acting as an intermediary, and through the the active co-operation of the Philadelphia Foundrymen's association, Mr. Penton conducted much of the preliminary work which led to the organization of the American Foundrymen's association in Philadelphia in June, 1896. He was elected the first secretary of that association and served in that capacity for 3 years.

During the 1934 convention of the A.F.A. in Philadelphia, the association recognized the important services which Mr. Penton rendered the industry and the association, and at that time presented him with an engrossed resolution addressed to "John A. Penton—Friend and Counsellor of Foundrymen," and a bronze statuette. The following are excerpts from the presentation talk of S. Wells Utley, president, Detroit Steel Casting Co., Detroit, and a past president of the association: (*Please turn to page* 104)

John Augustus Penton, founder and first editor of The Foundry, whose vision and enthusiasm created an industry consciousness and established the foundation for tremendous progress and development in the art of casting metals

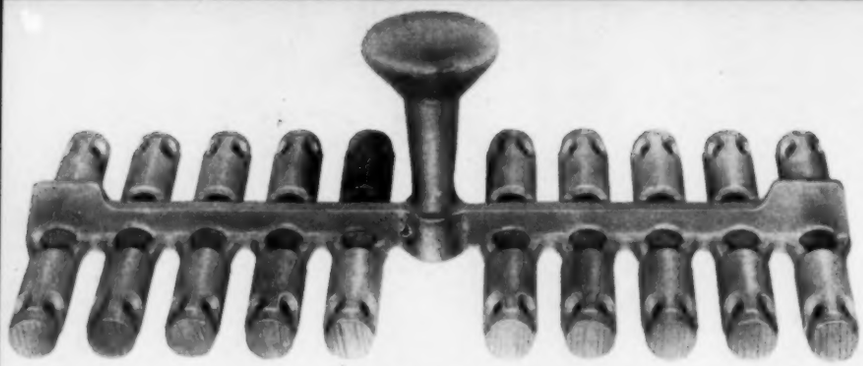
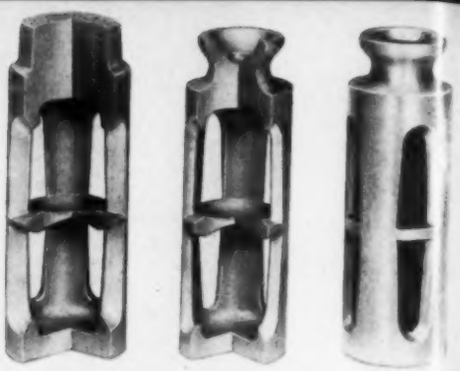


FIG. 1



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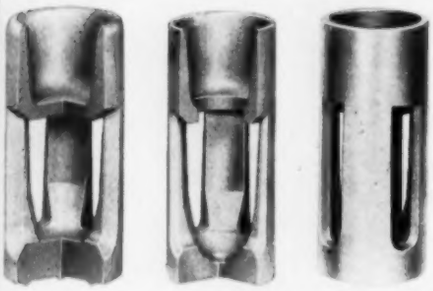


FIG. 3

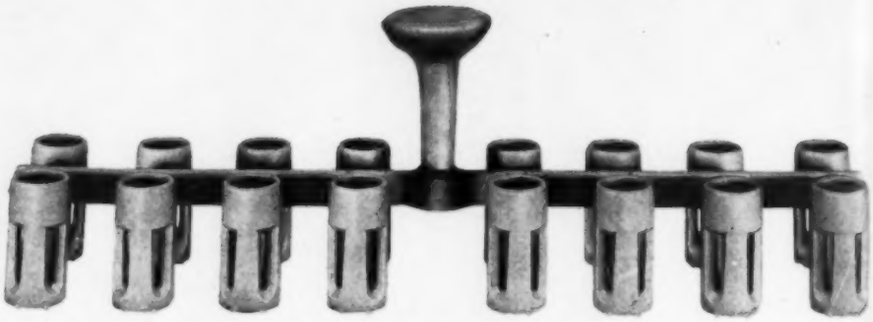


FIG. 4

FIG. 5

FIG. 6

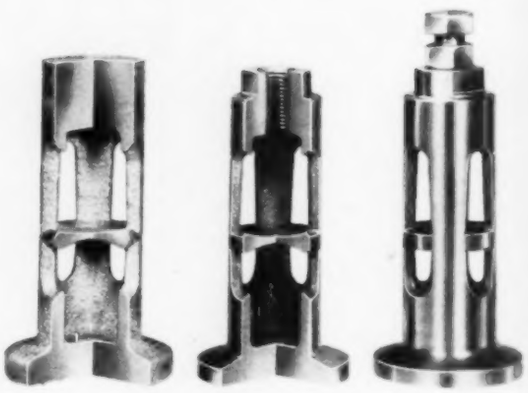


FIG. 7

Fig. 1—Gate of lifters for valve-in-head engine cast by conventional molding method. Fig. 2—Sectional view of lifter for same type engine showing ball seat at top. Fig. 3—Similar type with ball seat in the platform section. Fig. 4—Side view of gate of castings for valve-in-head engine cast by all green sand method. Fig. 5—End view of lifter showing serrations formed by grooved chill plate. Fig. 6—Side view of castings for L-head engine cast in vertical plane by all green sand method. Fig. 7—Sectional view of combination lifter, mushroom head design, L-head engine, with adjusting screw arrangement in top

MAKING chilled iron tappet-head castings for valve lifters for internal combustion engines has been a specialty of the Eaton-Erb Foundry division, Eaton Mfg. Co., Vassar, Mich., for many years. As a large production cast part, the barrel-type valve lifter is a recent development. That type is one of the many valve lifters in use today, as shown in Figs. 2, 3, 7 and 9. Its particular interest to the foundry industry is that it places another cast part in functional operation in modern internal combustion engines.

Design of the barrel-type lifter presented a distinct and unique problem to the foundry. From a casual glance the casting does not seem to present any particular difficulty in manufacture. It is only after the recognition of its vital functional operation that the casting problem involved in its production becomes apparent.

The valve lifter is that part of the valve mechanism acting directly against the cam in the translation of rotary motion of the camshaft to the reciprocation of the valve as indicated in Figs. 16 and 17. To perform its proper function, the valve lifter face is made flat, or nearly

FIG. 8

FIG. 9

FIG. 10

FIG. 11

Fig. 8—Set of patterns for cope, squeezer head and drag. Note holes in squeezer head for telescopic action of prongs on drag pattern. Fig. 9—Sectional view of lifter for L-head engine with adjusting screw arrangement at the top. Fig. 10—Cross section showing straight line of demarcation between chilled iron wearing surface and gray iron body. Fig. 11—End view of gate of castings for L-head engines cast in vertical plane by all green sand method

so, and held in contact with the cam by a spring. Thus, it is obvious that the valve lifter has several duties to perform. It must provide a cam contact face that is capable of functioning under heavy loads and high sliding velocities. Since the cam is the revolving part and the valve lifter reciprocating, there is considerable side thrust which demands high strength and good bearing qualities in the body section.

It is interesting to note the varying conditions of loading to which the valve lifter is subjected.

Barrel-Type Valve Lifters Molded in Green Sand

By EDWARD C. HOENICKE
Eaton-Erb Foundry division,
Eaton Mfg. Co., Detroit

At the start of the lift, or where the cam begins to act on the valve lifter, the inertia of all the parts—including the valve lifter, push rod, rocker arm, valve, etc.—resists this motion and in addition the force of the valve spring must be overcome. At a certain part of the lift, the shape of the cam is such that the load from inertia reverses and the parts are held against the cam by the spring only; part of this spring force being counteracted by the stored-up energy of the moving parts.

However, at this portion of the cycle, the cam wipes the face of the valve lifter from one side, through the center over to the opposite side so that even though the load is reduced, as compared with that at the start of the lift, the rubbing velocity is greatly increased.

If the nose of the cam is of small radius, the unit loading at maximum lift is extremely high. The whole action of the cam on the valve lifter face takes place on the average in one-third of a complete revolution, which means that at high speeds the time for the cam to travel over the valve lifter face, might be on the order of 0.0008-second. The valve-train mechanism also is sub-

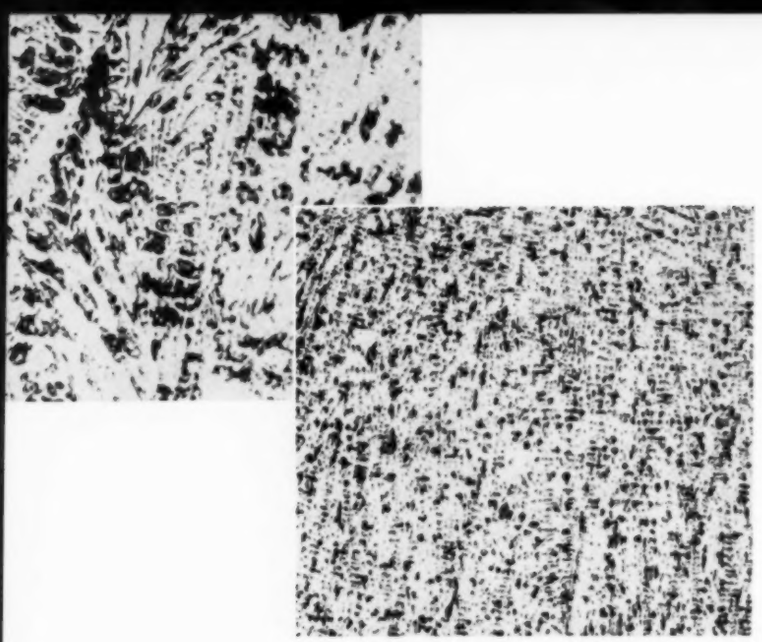


Fig. 12—Microstructures of the white iron chill forming the wearing surface of the barrel-type valve lifter

jected to variations in temperature with consequent expansion and contraction.

Since the camshaft is operating on fixed center and the valve must always be on its seat at the proper interval, some means permitting this variation must be provided between the cam and the valve. That generally is accomplished by inserting an adjusting screw in the top of the valve lifter so that when it is on the so-called back of the cam (not on the lifted portion), a definite clearance can be set between the valve lifter adjusting screw and the valve tip to allow for variations in length. The adjusting screw requires strong, accurate threads in the top of the casting.

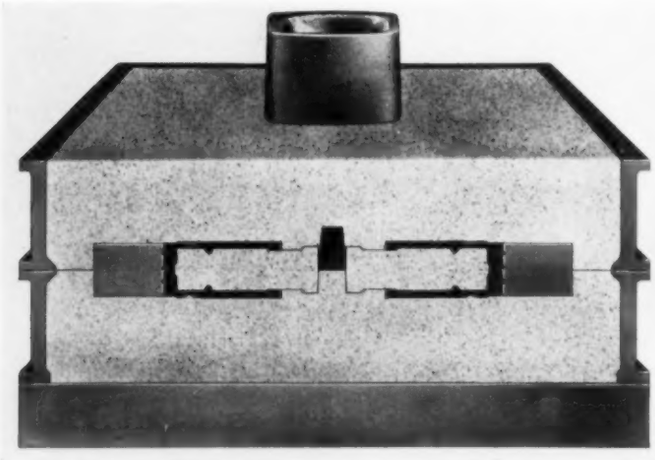
A gray iron casting suitable for this type of part must have a chilled face of white iron to resist extreme wear due to the cam action. Microstructures of the chilled iron are shown in Fig. 12. Also the casting should have gray iron side walls for strength to withstand the side thrust and high inertia loads ranging from 500 to 700 pounds. High sidewall strength also is essential to prevent distortion under heavy load as this would retard the spinning action of the valve lifter, which is necessary with each action of the cam to prevent localized wear. Sidewalls also must be uniform in section thickness for weight tolerance and of uniform hardness for machining purposes. The body diameter of a valve lifter is centerless ground and precision finished to plus or minus 0.0002-inch and any variation in sidewall hardness makes it extremely difficult to maintain these close tolerances in the machining operations. The ported window openings through the sidewalls also should have rounded corners to prevent scoring of the bore of the valve lifter guide hole.

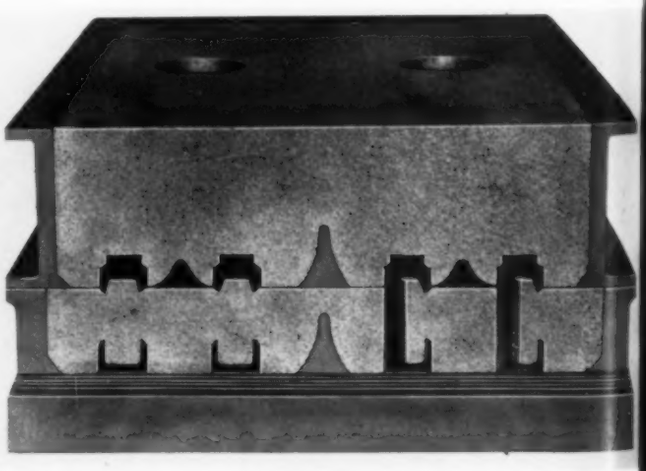
Held To Close Tolerances

Cam contact or wearing face of chilled white iron is held to a uniform depth of approximately ⅛-inch in the platform section and must be held to a dimensional tolerance on some types of valve lifters to plus or minus 3/64-inch. That close tolerance of chill depth is necessary as valve-in-head engines invariably require the ball seat machined in the platform section. The ball seat usually is machined to within 1/16-inch from the high limit of the white iron chill to take advantage of the close-grain metal structure at that point for wearing purposes.

Line of demarcation between the white iron chill-depth and the gray iron body must be held as near as possible to a straight line as shown in Fig. 10. The structure at the line of demarcation must be as free as possible of mottled or

Fig. 13 (Left)—Cross section of conventional mold for casting on horizontal plane showing individual chill blocks and dry sand cores forming inside diameter. Fig. 14 (Right)—Cross section of 2-part all green sand mold for casting in vertical plane with single chill plate forming bottom of mold, and showing suspension through window openings of green sand forming inside diameter





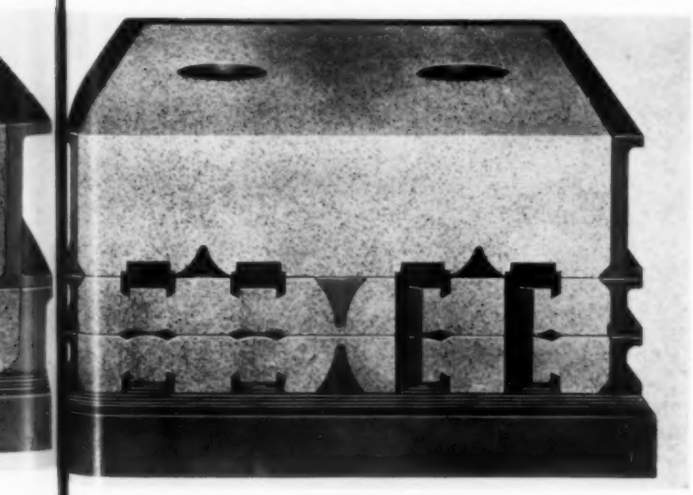
stringy chill-condition as that would give extreme difficulty in machining the ball seat and would be conducive to high tool upkeep cost as the ball seat operation is done with a form tool.

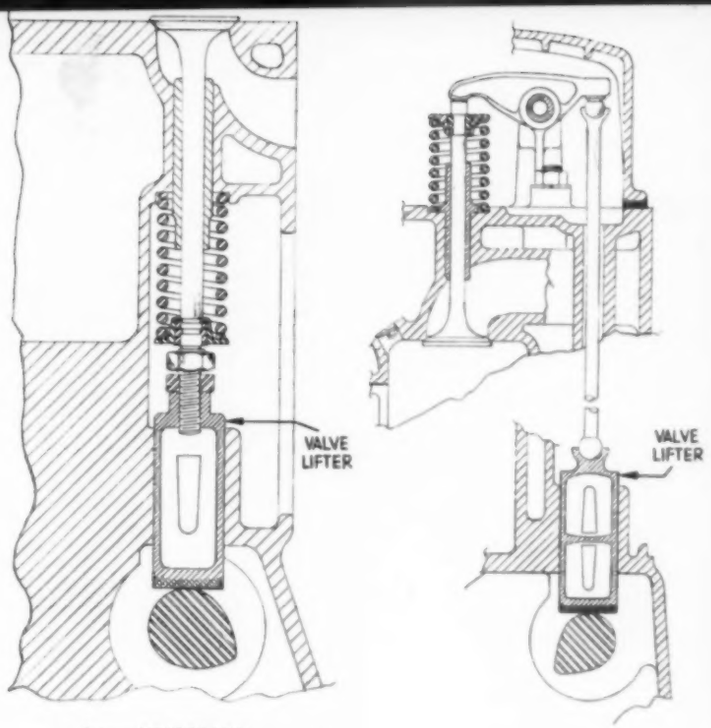
The conventional method first used in the foundry to produce barrel-type valve lifter castings was to mold in a horizontal plane with a baked dry-sand core to form the inside diameter, Fig. 13. A gate of castings made by that procedure is shown in Fig. 1. The white iron chilled wearing surface at the bottom face or platform section was obtained by individual metal chill blocks for each casting set in the mold. Difficulty in obtaining consistently good castings soon was apparent.

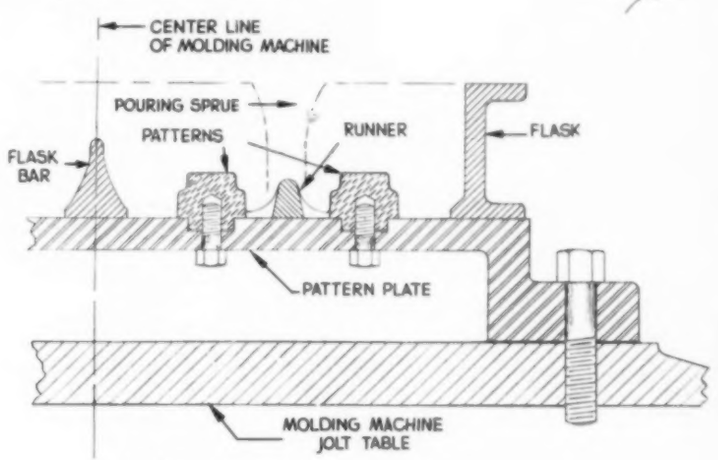
Caused Variations in Metal Hardness

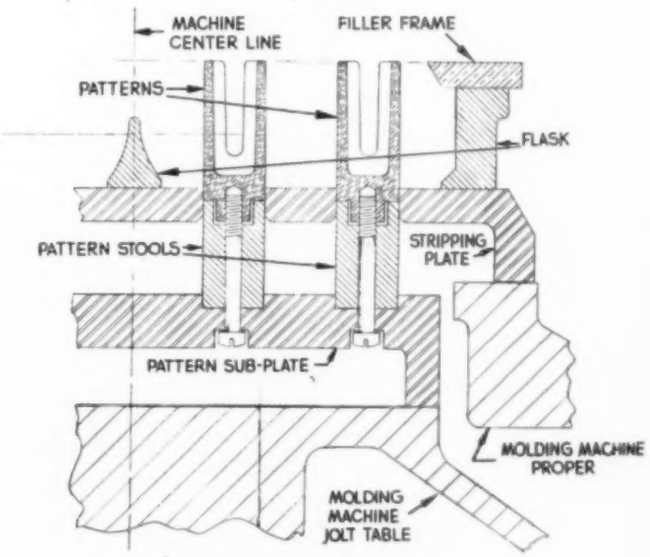
Lateral movement of the inside dry sand core would cause thick and thin sidewalls and subsequent variation in metal hardness. Longitudinal movement of the metal chill block would cause variation in the overall length dimension and also a variance in thickness of the platform section. With individual metal chill blocks of varying temperature for each casting, no consistent uniformity or depth of white iron chill was possible. A different chill condition could be obtained on each individual casting in the mold. It also was difficult to obtain a chill with a straight line of demarcation since during the pouring operation, molten metal filled the bottom of the mold first. Re- (*Please turn to page* 107)

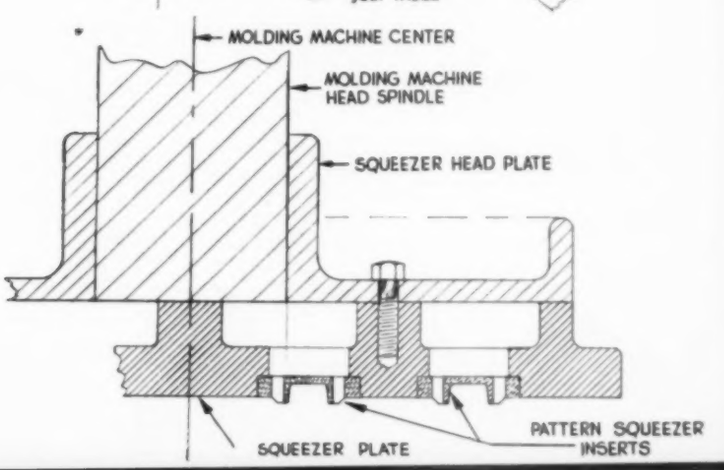
Fig. 15 (Below)—Cross section of 3-part all green sand mold. Fig. 16 (Right)—Valve train mechanism for L-head engine with adjusting screw at top. Fig. 17—Same except ball seat arrangement is at top. Fig. 18—Cross section of cope showing patterns, runner, gates and flasks assembled with pattern plate to molding machine. Fig. 19—Cross section of drag showing patterns, filler frame and flask assembled with stripping plate and sub pattern plate to molding machine. Fig. 20—Cross section of squeeze plate assembly showing inserted squeezer head patterns











SOME RECENT DEVELOPMENTS IN Iron and Steel Castings

By R. C. GOOD
Electro Metallurgical Co.,
New York

SINCE requirements imposed today by customers of iron and steel foundries differ somewhat from those existing 10 or 15 years ago, the progressive foundry has more than kept in step by spending a portion of its income in testing, developing and publicizing new features of its product. This form of self-education has demonstrated that closer attention must be given to details heretofore considered unimportant, and this review accordingly is an attempt to outline some of the advances in process metallurgy.

Specifications for higher physical properties, smaller tolerances of dimension, uniformity, and special properties such as resistance to abrasion, heat or oxidation are affected not only by charge, the cupola dimensions, size of the coke, depth of coke bed, and fuel ratio, but also by manner and order of obtaining the final chemical composition. Control of properties of castings is achieved today by a combination of methods. Several years ago, by changing the charge, foundrymen merely altered the chemical composition in order to modify the physical properties. This plan still is followed to a great extent; but other methods for improving properties without changing the final analysis of the product are being used successfully to an ever increasing extent.

Experiments at several research laboratories, including that of the author's firm show several interesting possibilities in that direction. Those experiments assisted in a closer determination of the individual effects of a few well-known practices. Since it is hoped that much more eventually will be learned about those factors, both individually and in combination, a summary of the present stage of development from the metallurgical side should be interesting.

The *Cast Metals Handbook*, published by the American Foundrymen's association describes the general properties of gray iron, of white iron, of malleable iron and of alloy iron; and also describes the influence of heat-treatment, influence of ordinary alloying elements, and ratio of

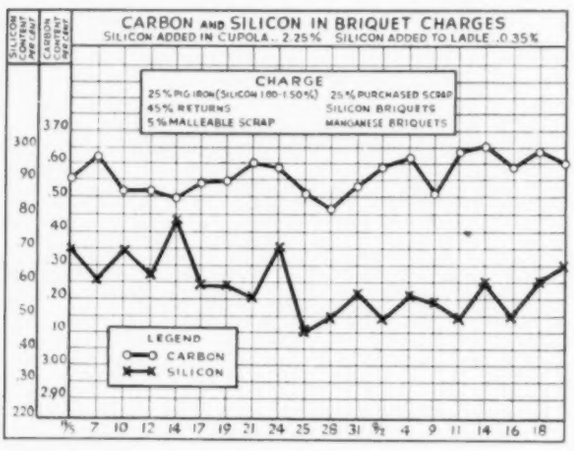
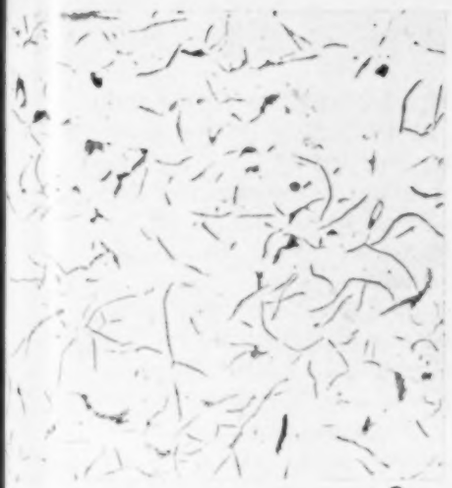


Fig. 1 (Left)—Relatively narrow limits in carbon and silicon obtained with principal silicon addition made with ferroalloy briquets. Fig. 2 (Right)—Briquetted ferroalloys with poor miscellaneous scrap gave comparatively good cast iron, 100 X. Fig. 3—Larger magnification (500 X) of structure in Fig. 2. Fig. 4—Improved iron using selected steel and cast iron charge with alloy briquets, 500 X. Fig. 5—Chill in cast irons. Left, untreated. Right, treated with 0.25 per cent special graphitizer. Fig. 6—Special graphitizer exerts no coarsening influence. Left, untreated. Right, treated. Fig. 7—Eutectic ferrite-graphite structure is responsible for poor physical properties. Fig. 8—Graphitizer added to same base iron shown in Fig. 7 prevents formation of undesirable ferrite-graphite. Fig. 9—Eutectic ferrite-graphite groundmass adjacent to chilled martensitic groundmass, 250 V. Fig. 10—Graphitizer added to same base iron shown in Fig. 9 prevents formation of ferrite-graphite. Fig. 11—Typical cylinder iron containing ferrite-graphite. Fig. 12—One per cent chromium-manganese-silicon-zirconium alloy added to iron in Fig. 11 reduces amount of ferrite-graphite and tendency to chill. Fig. 13—One per cent chromium-manganese-silicon-zirconium alloy added to soft iron on left increased chill as shown on right



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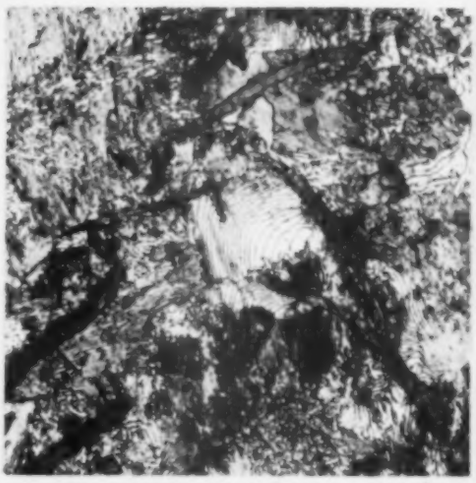

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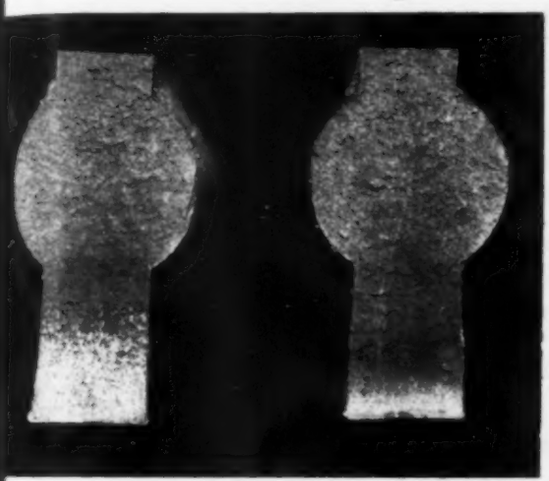

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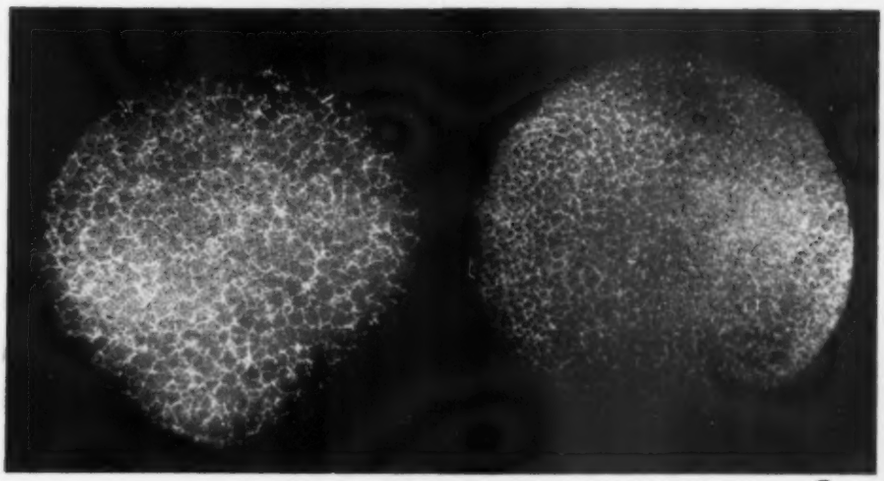

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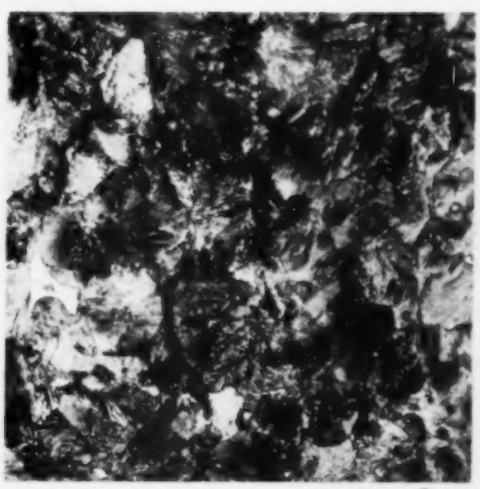

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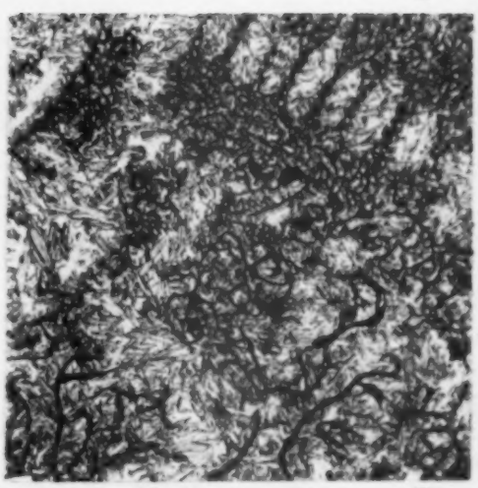

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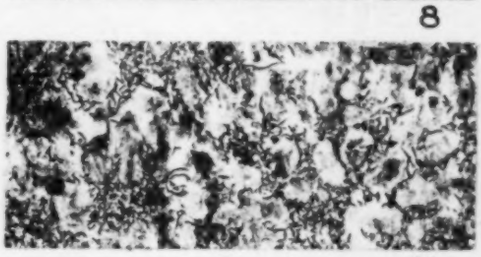

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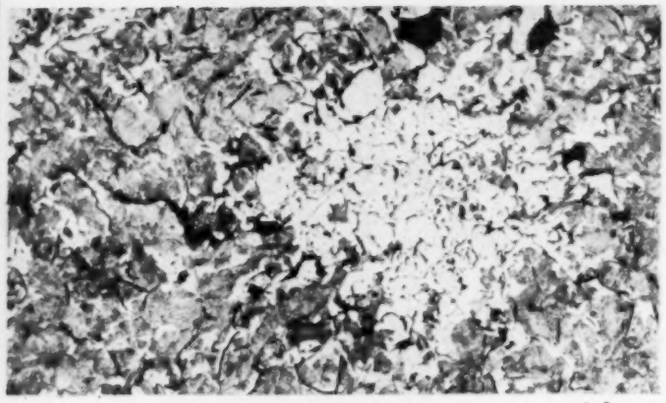

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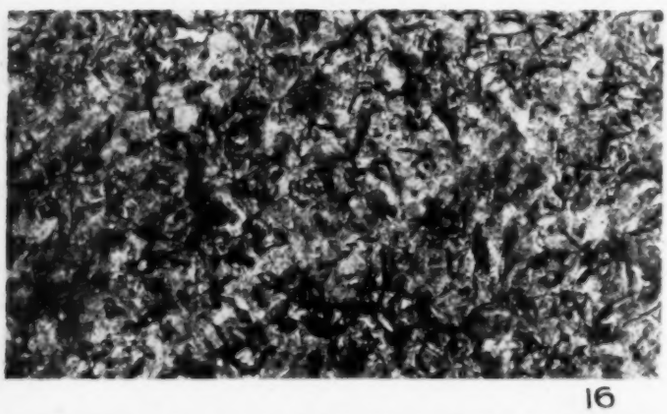

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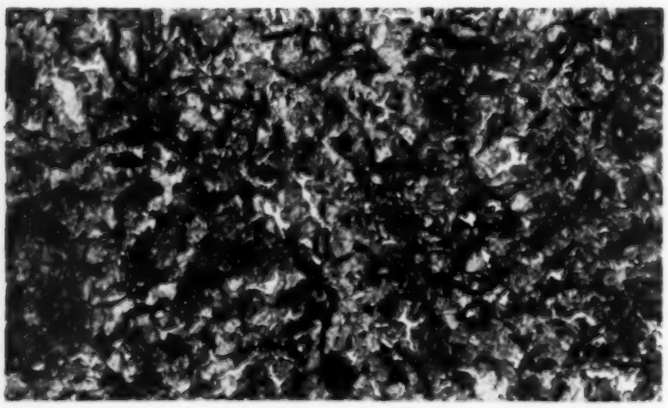

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shear and compressive strengths to tensile and fatigue strengths. A publication by the Gray Iron Founders society, written by V. H. Schnee, Battelle Memorial institute, is recommended for information on unalloyed iron castings, and a recent publication *Alloy Cast Iron* by the A. F. A. likewise should be consulted.

Practically all of the publications emphasize the influence of the micro-constituents on the physical properties, several of which should be mentioned. In gray cast iron, for example, the highest impact or shock resistance is obtained with a minimum amount of steadite, an iron phosphide usually found to a greater or less extent, depending on the phosphorus content. The greatest toughness and tensile strength of any unalloyed gray iron is obtained when the total carbon and silicon is on the low side, the structure close-grained and the metal well deoxidized. This may be obtained with the use of 50 per cent or more of steel scrap in conjunction with treatment by a deoxidizing agent. Pearlitic iron (made up essentially of pearlite and graphite, in contradistinction to ferritic iron, which contains ferrite, pearlite and graphite) has probably the most desirable combination of micro-constituents for any application, with the exception of those involving a demand for maximum machinability.

Iron Must Be Superheated

High-strength, unalloyed gray iron is difficult to obtain without superheating, since fine graphite, a necessary essential in irons of that type, is obtained most easily as a fine precipitate from a solution that is superheated until saturated.

Various constituents in iron influence its capacity to retain carbon in a combined state. Thickness of the casting also is a factor affecting the time during which carbon may be precipitated as graphite. Careful control of those constituents and of the physical factors that affect the solubility or saturation of carbon is essential if hardness, machinability and ductility in both heavy and light sections is to be regulated. Variation in hardness between the light and heavy sections of the same casting, which is a measure of what is termed wall sensitivity, is not characteristic of all cast iron, as especially produced irons may be remarkably free from it despite the different periods of time for solidification in the mold.

Use of a chemical (*Please turn to page* 110)

Fig. 14—Ferrite-graphite, wall sensitivity and marked tendency to chill are undesirable in essentially chromium-free iron. Fig. 15—Addition of 0.50 per cent chromium prevented formation of eutectic ferrite areas and increased tensile strength. Fig. 16—Raising chromium to 0.75 per cent made further increase in tensile strength. Fig. 17—Increasing chromium to 1.25 per cent raised tensile strength to 36,000 pounds per square inch

PROBLEMS IN NONFERROUS FOUNDRY PRACTICE

By W. B. GEORGE
Foundry Engineer
R. Lavin & Sons Inc., Chicago

PREPARED primarily to promote oral discussion this paper presents some of the more important items of brass foundry practice in condensed form without going too far into intimate detail on any of the items. Naturally molding sand comes first on the list. For general jobbing brass and bronze castings ranging in weight from 1 to 100 pounds, the sand permeability will vary from 12 to 25, depending on the type of casting. On the same basis the green bond strength will be between 5½ and 8½ pounds; the average grain size between 100 and 200; clay content 15 to 20 per cent and moisture 6 to 7 per cent.

Sand for molding aluminum castings differs from the foregoing with a permeability from 4 to 8; green bond strength 5 to 9 pounds, average grain size between 175 and 250; clay content 20 to 30 per cent and moisture 6 to 7 per cent. At approximately the opposite extreme, sand for nickel silver with 20 to 30 per cent nickel content should have a permeability between 40 and 60; green bond strength 5 to 8 pounds, average grain size 70 to 100, clay content 15 to 20 per cent; moisture 5 to 6 per cent.

Many castings are lost through carelessness, lack of skill or knowledge on the part of the molder who cuts the gates and runners. Many apparently unaccountable hazards are present between the lip of the crucible and the casting. Slag from a scab may develop in the runner; blacking or sand are eroded by the flowing stream of metal; sand cuts in the sprue; slag enters with the metal; dross is formed through agitation of the metal while pouring. Other common and uncommon causes for casting loss are part of every practical foundryman's experience.

Trapped dirt and drosses in the stream of metal can be eliminated by proper runners which will throw this nonmetallic material out of solution wherever the stream drops in velocity or changes direction. Keeping this fact in mind that dirt and dross will be thrown out of solution if given a chance, various types of whirl and skimming gates may be applied.

Care Required In Melting

The melting department, one of the most important in a foundry, frequently is operated in a haphazard and inefficient manner. Countless headaches and financial losses result from not having a thorough understanding of the proper procedure. There is no cure-all regardless of the type of furnace. Coke, coal, gas, oil fired or electric furnace will produce either good or bad metal depending on method of manipulation. Metal gives up its gas when it changes from a solid to a liquid state. Reabsorption takes place when the metal is superheated.

Brass and bronze alloys melted under glass will show a silver sheen just after they change from solid to liquid. This is the only time they are free from gas. The sheen can be seen only in a reducing atmosphere. Metal cannot be cast at this stage, but has to be superheated to attain fluidity. During this period the metal absorbs gases in propor- (*Please turn to page* 114)

Casts Aluminum Giant Tire

PAUL BUNYAN, hero of tall tales for the past 100 years in every lumber camp in America, and his no less famous blue ox *Babe*, three axe handles and a plug of chewing tobacco across the forehead, are credited either singly or in partnership with moving what the ordinary person even slightly familiar with the beautiful virtue of truth might regard as incredible loads of lumber and other materials from one place to another.

Veracious chroniclers claim that the hundreds of islands which dot Puget Sound and Georgia Strait between Vancouver Island and the mainland of Washington and British Columbia formerly were part of the Cascade mountain range. They interfered with one of Paul's logging jobs. He rigged up a scoop, hitched Babe to it and—well, there they are!

Local, amateur, professional, deep sea and barking dog mariners caught in the eddies, cross currents and tide rips between the islands usually refer to the late Mr. Bunyan in rude, salty and highly uncomplimentary terms. Strangers, tourists and miscellaneous travelers from the East stumble over the pronunciation of Puget. They render it Puggit and phu-get with the hard *g*, or pudget or poojet with the soft *g*. Those who have been to Europe, or who can claim acquaintance or kinship with those who have been to Europe venture on Poojay with the main accent on the jay. Native and acclimated inhabitants of the Pacific Northwest say Pew-jit. Up to the present no person has blamed Paul for in-

Fig. 1 (Top left)—Mold cheek suspended above the drag. Mold gated at four lower joint corners and also in center at top. Fig. 2 (Upper center)—Pattern for tire tread was formed in 29 duplicate sections held in a plaster shell. Fig. 3 (Lower center)—Three plugged runner basins were mounted on the cope. After they were filled plugs were removed and the metal flowed rapidly into the mold. Fig. 4 (Bottom)—Showing inside of a completed casting. Chills employed to promote uniform solidification are shown in the center

Lining for Mold... By PAT DWYER

venting the tricky, tongue-twisting name.

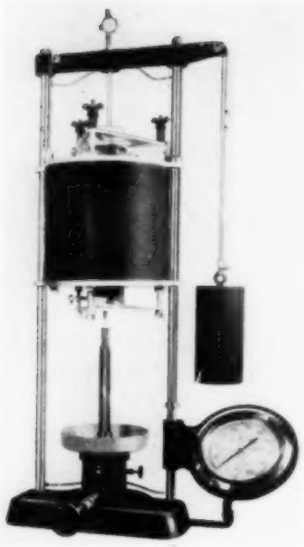
Paul was a mighty man in his day, a day when mechanical equipment was in its swaddling clothes. A day of wooden ships and iron men when bull strength and endurance rated above the christian virtues of cleanliness and godliness. The day has gone by. Paul has gone to join Thor and the other immortals in the halls of Valhalla. With the old trusty peavey in one hand and a cant hook in the other, he acts as umpire on field days when the boys play with the thunder bolts. With trace chains bright and jingling, the Babe drags fallen gladiators or impudent spectators away to the dump.

Moving vast quantities of materials no longer is a manual job or one depending on horse or ox drawn scoop. A country wide program of building new roads, straightening and leveling old roads has called into existence mechanical equipment greater and more powerful year after year. Airplane fields, dams and other public works in recent years have necessitated the movement of more material than the late Mr. Bunyan is credited with having pushed into the Pacific ocean. One of the most powerful machines for this type of work, built by the R. G. LeTourneau Co., Inc., Peoria, Ill., is shown in Fig. 5.

Until recently the tires on this machine were the largest every built by the Firestone Tire & Rubber Co., Akron, O. The unit on which the 30.00-40 tires are mounted is shown after it had scooped up a full load, enough to fill an ordinary garage. After the picture was taken during the construction of an air port in Georgia, the driver shifted through his six forward speeds and moved the 200,000 pounds gross load off to dump at a new site. The 33-inch cross section of these tires is so large that dozens of the popular 6.00-16 passenger car tires could be hidden inside. Each giant tire has 34 plies of gum dipped cord fabric. Outside diameter of the tire is 104 inches. The weight is equal to that of a small automobile.

Another set of larger tires probably will be completed before this reference is published. Each tire will be 36.00-40 in 34 and 38 ply construction. The 34 ply tire will have a carrying capacity of 55,200 pounds or nearly 28 tons. Tire, tube and flap will weigh 3656 pounds. Steel casings in which the tires will be formed were cast at the plant of the Otis (*Please turn to page* 118)

Fig. 5—Each tire 104 inches outside diameter on this huge earth moving machine carries a load of approximately 28 tons



Core Behavior AT ELEVATED TEMPERATURES

By HARRY W. DIETERT
President
Harry W. Dietert Co., Detroit

METHOD of controlling physical properties of a core at room temperature has received considerable study and is being given much attention by foundrymen. At present, foundrymen have only certain beliefs concerning the proper way to control physical properties and behavior of an oil bonded core at elevated temperatures.

More successful foundry practice may be secured when definite information is available on controlling the action of a core when exposed to the high temperature of molten metal. As a step in that direction the following is presented feeling that it will be of general practical value.

When a core is surrounded by molten metal it generally is conceded that the core first expands or increases in volume, due to growth of the silica grains. Next, it collapses when the bond is destroyed by the heat. Manner in which the expansion and collapse, or breakdown of an oil bonded core may be controlled is of interest.

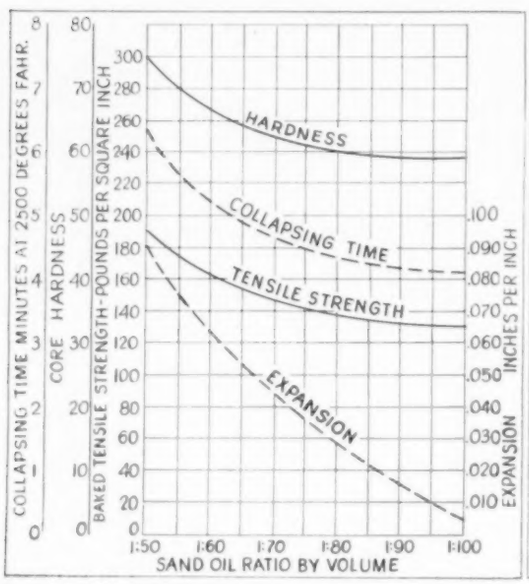
A core at room temperature is judged largely by its strength. One of the best methods of evaluating the strength of a core is by the tensile test. A second method of (*Please turn to page* 112)

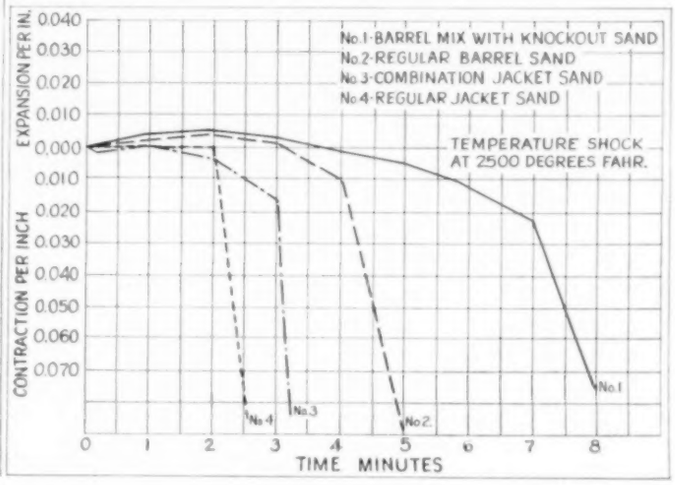
Table I

Core Collapsibility Test Data

	Core No. 1	Core No. 2	Core No. 3	Core No. 4
	Knock-out-			
Percentage Bentonite	sand	1.75	0.70	0.0
Percentage Cereal Binder	0.1	0.23	0.10	0.1
Core Permeability	109.0	121.00	190.00	250.0
Time of Breakdown in Min.	8.0	4.80	3.25	2.5

Fig. 1 (Upper left)—Dilatometer furnace set-up for determining collapsibility of cores. Fig. 2 (Left)—Baked core properties under varying oil ratios. Fig. 3 (Below)—Volume change and collapsibility of baked cores





FOUNDRY Personnel Relations

By H. J. NOBLE
Works Manager
American Cast Iron Pipe Co.
Birmingham, Ala.

EFFECTIVE personnel work depends largely upon three main factors of company policy. The first factor is the degree of sincerity or desire of the company to promote personnel work which will be reflected in its policy covering the relations program. The second factor upon which a successful personnel plan depends is the personnel of the personnel department, and the third is based largely upon the desire and ability to reach and deal with the individual employe rather than the promotion of a program which deals entirely with the mass or with smaller groups throughout the organization.

In the first instance, no personnel director can function effectively without the support of the entire organization. Too often the mere hiring of a personnel officer or the establishment of a personnel department is considered a cure-all, or that it is the proper thing to do in the light of present day conditions. This man or his department is expected to fill a much needed void between company and employe, thereby relieving the company of further thought and worry in the field of employe relations. This careless attitude results in an unsatisfactory attempt in promoting good employer-employe relations and if projected on this theory, it had best not be undertaken.

On the other hand, some companies approach the problem in a more determined manner and on a much broader front. In some instances they are putting their policy in the field of human relations in writing. Statements of their intent in this field cover such items as employment, compensation, training, education, working conditions, medical service, insurance, benefits, etc., and lately it has been felt necessary in some cases to extend the list to include written rules covering such items as impartiality or nondiscrimination.

This practice tends to a clearer understanding, removing possible doubt from the minds of the employe and at the same time gives the personnel staff a firm and substantial platform upon which to base its work. In addition many other items may be covered, not the least of which is the latitude of discretion allowed the personnel director in the handling of individual distress cases.

The personnel director, manager or counselor, as he is sometimes designated, should attain a rank in the organization equal to that of the major supervision. His department should be ranked equal with other departments and become, with them, an accredited part of the organization, and receive the same interdepartmental co-operation as any of the major divisions of the plant. It cannot function as an entirely separate institution or as a thing apart and foreign to the current plant activities.

It is, therefore, not always advisable to procure the personnel director elsewhere. Usually there is within the organization a man with the necessary qualifications to undertake the work and to command plant-wide co-operation. He must of course be one who has the respect of the entire supervision, as he will account everyone in this group active (*Please turn to page* 92)

Questions and Answers

Metal in the Hub of a Runner Is Hardest Part of Casting

We are enclosing blue print of a small runner made partly in green sand and partly in a dry sand core. It is cast in the opposite position to that shown and is gated on the rim The metal analyzes approximately: Silicon 2.40 per cent, sulphur 0.06 per cent, phosphorus 0.58 per cent, manganese 0.52 per cent. Parts of the mold are green sand, while the remainder at the left side is made in a core. In machining the casting we find that the metal in the hub is too hard to machine. Iron in the lower flange is not quite so hard, while the metal in the upper flange is quite satisfactory.

Unless the center core is a chill, experience would anticipate the softest iron at the hub, next softest at upper flange and the hardest iron in the thin flange. Analysis of the iron is satisfactory for castings of this character. Where other conditions are equal, iron poured in a core or a dry sand mold is softer than iron poured in green sand. Yet in this instance the iron in the thin central disk is hard while the iron in the other disk attached to the vanes and poured in green sand is satisfactory. Iron at the center of the casting should be softer than iron at the rim for the simple reason that it is surrounded by a dry sand core, is thicker in section than any other part of the casting and therefore has a chance to cool more slowly. In theory the center should not be hard, but since in actual fact it is hard we suggest changing the gate from the rim to the center, using a ring of small pop gates. In that manner the core and the surrounding sand in the vicinity will become heated to an extra extent with a resulting softening effect on the iron. Also, instead of parting the pattern as shown we should favor reversing the position of the pattern in the mold.

Permanent Molds Formed from Various Metals Are Used

We shall appreciate information on permanent molds. What kind of metal is used in their construction. Where are they used and how long do they last?

Permanent molds, a term used to distinguish them from the usual sand molds, are made from bronze, cast iron or steel. To some extent the term is misleading since no molds really are permanent in the sense that they last indefinitely. A better term would be long life molds. The bronze molds are used for making small low melting alloy castings by the so-called slush mold process. The metal—usually zinc or zinc base alloy—is poured into the mold and allowed to stand until a shell has solidified in contact with the mold. Thickness of shell is determined by the length of time the metal remains in contact. The remainder of the metal then is spilled out, leaving a hollow casting without the necessity of using a core. The process is employed principally in the production of intricate, hollow, ornamental castings.

Cast iron molds are employed in production gray iron foundries where immense quantities of plain and comparatively plain, small castings are made. Alloy steel molds are used in plants where cast iron pipes are made by the centrifugal process. Touching on the life of the molds, the bronze molds last indefinitely. Usually the ornament or novelty becomes obsolete before the mold becomes useless. In some instances cast iron molds have produced 200,000 pieces before they were discarded, usually because of fire cracks on the face. The usual life for an alloy steel mold in the pipe shop is from 8000 to 10,000 castings. A familiar example of one type of permanent mold is the cast iron ingot mold into which steel is poured to form ingots for the rolling mill. Life of these molds varies from 50 to 150 heats.

Has Trouble with Water Cooled Mold for Sash Weights

We have had considerable trouble in an attempt to make sash weight castings in water jacket cast iron molds. Can you give us any information on the design of the molds, pressure required to hold them together, pouring position and any other pertinent features.

Any attempt to describe construction and operation of water cooled molds for making sash weights simply would represent wasted effort. The method has been tried on several occasions but so far as we know no longer is in use by any sash weight manufacturer. Theoretically the idea is sound and economical, but as in many other instances practical operation does not coincide with theory. The molds crack, leak and twist to such an extent that the cost of repair, maintenance and general supervision outweighs any theoretical saving. A casual glance through our index shows that the subject of sash weight manufacture has been discussed in THE FOUNDRY on 24 occasions during the past 20 years.

In 1925 a continued series of eight articles described every known method for making these castings. For large quantity production the most popular method

s a multiple mold in which horizontal steel pipe patterns are located by small holes in a vertical plate. After the flask has been rammed full of sand to form 8 or 10 tiers of molds, the patterns are pulled through holes in the end of the flask. Openings are plugged with small cores which also form the eyes. The vertical plate is removed and the resulting opening serves as a runner for the metal to enter the multiple mold cavities. An illustrated 3 page article on this and two other methods appeared in the Aug. 1, 1921 issue of THE FOUNDRY.

Pin Holes in Cast Steel Hinge Caused by Sand Condition

We are sending a cast steel hinge which is indicative of a trouble rather prevalent in our foundry. The pinholes cause rejection. The casting is made on a squeezer in green sand. The sand is made as open as possible by a low clay content, and steel is made in acid electric furnace. There is a difference of opinion on whether the trouble arises from wet sand or wild metal. The latter seems impossible since we deoxidize late in the heat (10 minutes before pouring) with manganese and silicon, and use as much as 10 pounds of ladle deoxidizers—aluminum, etc. to 1½ tons of steel. Metal analyzes average: Carbon, 0.20 to 0.30 per cent; manganese, 0.70 to 0.80 per cent, and silicon, 0.35 to 0.40 per cent.

Careful examination of the specimen indicates the trouble is due to sand conditions and not to gassy or wild steel. It is not possible from inspection of such a casting to say definitely just what is wrong with the sand, or what should be done to prevent the occurrence of the defects—that would have to be determined by testing and inspecting the sand in the foundry, including a check on the conditions of the molds themselves on how hard rammed, etc.

However, it looks as if the casting had been poured very hot, in a sand that does not stand up under the particular conditions, and it cut quite a little near the gate—with the result of producing a sand boil and pinholes. Do you pour a chill block from the test spoon and note whether the metal is *dead*, or *spits* indicating improper deoxidation? Possibly you may be using more deoxidizer than necessary.

Wants Information on How Plow Point Castings Are Hardened

While going to high school about 5 years ago I fitted up a small place at home to make small brass castings. About a year ago I was joined by four boys ranging in age from 13 to 27 who helped me build and fit up a foundry for the production of iron, brass and aluminum castings. We have an open flame nonferrous melting furnace of 600 pounds capacity, but we built all the other rigging ourselves from the crane to the cupola. We make plow points, hog oilers, stoker parts and stove repair parts. We shall appreciate your advice on: 1—How to harden the plow points; 2—How to prevent spongy spots in brass bushings; 3—How to make a proper mixture for a gear blank 10 inches diameter 1½-inch face. The gear must be as strong as possible but not too hard to machine.

Plow points are hardened by pouring them from an iron mixture in which the silicon content is about 1.00 per cent. A piece of cast iron conforming to the outside contour of the plow point forms part of the mold. It is placed on the pattern and rammed up with the drag. When the molten iron flows into the mold the part coming into contact with the chill retains all the carbon in the combined form and hence is exceedingly hard. The chill must be clean, smooth, dry and covered with a light coating of oil and plumbago. Spongy spots in brass or bronze bushings may result from many causes. The most prevalent is a mold or core which prevents the metal from lying quietly. A more or less violent boiling action produces scum which floats a short distance and then becomes anchored to the wall of the mold or core. The metal flows around it and the dirty or porous area is not discovered until the cutting tool removes the outer layer of metal.

Suitable mixture for a 10-inch gear blank might conform to the following approximate analysis: Total carbon 3.30 per cent, silicon 2.00 per cent, manganese 0.80 per cent, sulphur 0.09 per cent, phosphorus 0.30 to 0.50 per cent.

Frying Pan Casting Is Rough In Front of the Gates

We are having difficulty in getting clean frying pan castings in the vicinity of the gates. The pan is 11 inches diameter and carries a series of light ribs on the inside of the bottom. The pattern is printed back and the casting is poured double. We shall appreciate your advice on the proper method of gating these castings.

If the casting is rough in the vicinity of the gate, but quite satisfactory in every other area, it is apparent that the sand is at fault and not the gating system. A close examination of the affected area would be necessary to determine whether the sand washes in front of the metal, or, if it simply fuses a little. The first form of defect is caused by lack of sufficient bond. The second by an excess amount of bonding material of a low grade. Pending the adoption of a sand free of either of the foregoing shortcomings, temporary relief may be secured by facing the mold in the vicinity of the gate with sand containing one part coal dust to 12 parts sand, or alternatively by spraying a little molasses water over the sand near the gate.

Your reference to pouring them double is rather ambiguous. The term may mean that you are molding and pouring them two in a flask, or, it may mean —and this is the usual foundry meaning—that you gate each casting on both sides and pour the metal from two ladles. We rather doubt the second hypothesis, since iron of ordinary fluidity readily will fill one of these castings from a single sprue. The usual method of pouring these castings is in a single flask, through a flat wedge gate over the center. This type of gate also may be used where the castings are molded two in a flask, provided both castings are poured simultaneously from two ladles. If one is poured before the other, the gas from the first mold will accumulate in the second mold and will cause a slight explosion unless ignited, usually by a drop of iron from the skimmer.

Hot Castings Are Hard To Inspect

When annealing cast iron containing approximately 2.25 per cent silicon, is there any advantage in getting the castings from the molds into the annealing furnace while they are still hot, or should the castings be allowed to become cold before placing in the annealing furnace? Castings being annealed are approximately 10 pounds in weight with a metal thickness ranging from ⅛ to ¾-inch and require a soaking period of approximately 1¾ hours at 1625 degrees Fahr.

So far as we know, the only reason castings are permitted to become cold before annealing, is to facilitate handling and inspection, etc. It hardly is necessary to point out that handling hot castings would be a rather uncomfortable job, and inspection for defective castings almost would be impossible. However, if all inspection was performed after the castings were annealed, it would simplify the problem considerably, since some methods of handling the hot castings could be devised which would protect the workmen from the heat.

Theoretically, it would be advantageous to place the hot castings in the furnace since considerably less heat would be required to bring them up to the desired holding temperature, and less time would be required in reaching that temperature. In very critical cases when cracking is a factor, keeping hot throughout will minimize casting stresses and chances of cracking. Undoubtedly considerable experimental work would have to be done to determine the best operating cycle starting with hot castings since there is no doubt that they hardly all would be at the same temperature when placed in the furnace.

Holes Result from Lack of Feed

We are sending some bracket castings which are giving trouble due to the holes appearing at the junction of the heavy and light sections. We believe this to be a gas condition, and would like your opinion.

While it is possible that the holes in the castings might be due to mold gases not escaping freely at the particular point involved, it is our opinion that the major cause of the trouble is lack of feeding, and the heavy section shrinks away from the faster cooling thin section. You may be able to overcome that trouble by increasing the ferrostatic pressure through use of a much higher cope, and suggest that you try that first. If that is not successful in curing the defect, you will have to change your method of gating to feed into the heavy sections, or put risers over those sections large enough in size to do the actual feeding. Also check-up on pouring temperature. Either too hot or too cold metal promotes shrinkage.

Defective Castings Caused by Mold

We make refractory service press or die pads ranging in size from 4½ x 9 inches to 12 x 24 inches and in thickness from ¾ to 2½ inches. The castings are designed for long wear and are machined all over. Many castings are perfect, but a considerable number show blow holes after a cut has been taken on the cope side. We have tried various iron mixtures, but apparently without any effect on the percentage of scrap castings.

Composition of the iron affects the chemical and physical properties of the castings, but is not often a factor in the production of blow holes. This form of defect is the result of faulty molding or melting condition, usually the former. In occasional instances the iron is to blame where it is melted with a low bed and heavy blast. In these instances the blowholes are not concentrated under the cope, but are scattered all through the casting. In other instances a somewhat similar defect is found where metal is poured from a damp ladle. The iron is impregnated with steam.

A certain amount escapes, but the remainder is trapped in the solidifying iron. From the data supplied in your inquiry we should place the blame on the mold. The sand is too wet, too hard or is not of sufficiently high permeability. Since many castings are satisfactory, it may be assumed that the sand has proper natural characteristics, but is not manipulated properly to allow the steam to escape freely. Steam is generated in large volume where the metal covers the bottom of the mold. A certain amount bubbles up through the iron. Where the bubbling ceases before the metal solidifies, no trace remains.

Where the bubbling continues after a sheath of metal is formed on top through contact with the cold cope, some of the bubbles remain and only appear after the machine tool removes a certain thickness of metal. Obviously the remedy is to vent the bottom of the mold with a wire, scratch or stamp channels in the sand immediately under the bottom board, and leave a reasonable space between the bottom board and the bottom edges of the drag. The sand should be worked as dry as possible and rammed only hard enough to prevent the casting from swelling.

Normalizing Gears Will Not Help

We have experienced considerable trouble with our gear rim castings for elevators, due to changing shape after they have been cut on the gear hobber. We would like to know if normalizing the castings would correct that trouble. Sizes of rims are approximately 13-inch diameter with 1½-inch face; 18-inch diameter with 2¼-inch face, and 26-inch diameter with 2¾-inch face. Alloy is 88-10-2 and phosphor-copper is added. Is it best to normalize the gear rims in the rough or should the teeth be roughed out first and then normalized? Also, advise what is the proper temperature you would recommend, and how long a period. Would a small percentage of nickel in the mixture help any?

Normalizing gear rims to remove casting strains so that they do not change their shape when machined probably will not be satisfactory for your purpose. It also would affect the crystal structure so that the wear resistance would be reduced materially. Wear resistance is one of the most important characteristics for worm gear service. Addition of a small percentage of nickel would raise the pouring temperature of your castings. This would change the temperature at which the castings set, and probably would change the warping upon relieving of casting strains by machining. What change might result can only be found out by experiment.

A solution of the problem is to study the method of gating and arrange so that the metal enters the gear rims in such a way that the normal gradient of cooling takes place circumferentially around the gear rim, thus avoiding a marked difference in time that one part of the rim sets as compared with another. This will mean that a minimum amount of distortion will take place when the skin is removed.

A further precaution that has proved valuable in such castings is to remove the outer skin and let the gears stand in the machine shop for two or three weeks before final hobbing takes place. In this way the dimensional changes are compensated for by the fact that the final machining takes place *after* the casting strains have been relieved by the removal of the first skin. However, if the condition you mention is very bad, and the suggestions outlined do not work, you might try rough machining followed by putting in a core oven at 450 degrees Fahr. for several hours, say up to 16 hours. That may be found to be of material benefit in this particular instance.

UNIFORM STRUCTURE PROTECTS YOUR PROFITS

Photos courtesy Allyne-Ryan Foundry Company, Cleveland

NICKEL

CAST IRONS

CYLINDER LINERS require close-grained structures and high machinable hardness in a wear-resistant cast iron. Uniformly from heat to heat, these properties are combined in Nickel cast irons.

CYLINDER HEADS need uniform, dense-grained cast irons which resist growth and warping at elevated temperatures . . . with pressure-tightness assured by freedom from shrinks and porosity. Nickel alone or in balanced combination . . . assures these requisites, protects profits by guarding against costly rejects.

ENGINE BLOCKS of complicated design require strong castings, readily machinable, pressure-tight, uniform in structure throughout. Chilled areas, embrittlement even of thin cooling vanes, means more rejects. Nickel cast irons regularly help foundrymen solve these casting problems.

Your consultation is invited regarding profitable production of castings from Nickel alloyed irons.

FOUNDRY FUNDAMENTALS

Basic reasons why Nickel cast irons produce uniformly better castings

1. Nickel goes into solution easily and evenly.
2. Nickel additions eliminate carbides, disperse graphite and develop the matrix.
3. Nickel does not oxidize in the melting operation, therefore, you recover the Nickel you put in your charge or in your returns.
4. Nickel cast irons are normally free from chill and hard spots on edges and thin sections. They are fine grained, dense and readily machinable.
5. Nickel is available in low melting point "F" shot form for spout or ladle additions or ingot form for cupola use.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

Steam Forms a Hole In Thin Plate

We are forwarding for your inspection two small pieces broken from a gray iron casting ⅛-inch thick. The casting has shallow diamond shaped indentations on one face. The other face is plain and is finished to a smooth surface by grinding. You will note a single small cavity at one point and a small smeary trace of some foreign material disclosed by the grinding at another area. We shall appreciate your opinion on whether this defect is due to slag, to the sand, or to the iron mixture.

The small hole contains several little iron globules, direct evidence of slight local boiling action in the metal. The jet of steam may have been developed at the present position, or it may have been formed at another point in the mold and carried with the flowing stream to the present location where it was held by the rapidly solidifying metal above and below. The smeary area above and to the right of the cavity may be a thin film of slag, but more probably it is part of a slushy film which forms on the surface of metal when it is disturbed by gas or steam. From the appearance of the remainder of the casting it is apparent that your sand is suitable and is maintained in proper condition. The defect is caused by a small lump of wet sand, a clay ball, or possibly some other foreign material accidentally present in the sand lying next to the pattern and later next to the casting face.

Ejector To Resist Abrasive Action

We have been offered orders for castings used in ash ejectors, and would like to know a suitable composition for that type of work. We are sending a specimen broken from such a casting which you will observe is chilled all the way through. Can we use a crucible furnace for melting the material if it is special composition, and what degree of heat should be applied for melting? Do you think it will be necessary to use a silica wash on the mold face?

While we do not have facilities for determining chemical composition, we believe that the specimen submitted to us is a composition containing about 4.5 per cent nickel and 1.75 per cent chromium, since such an alloy iron is employed for numerous parts which must be resistant to abrasion. The alloy is known as Ni-hard, and the composition range is as follows: Total carbon, 2.75 to 3.50 per cent; silicon, 0.50 to 1.25 per cent; manganese, 0.35 to 0.50 per cent; phosphorus, not over 0.30 per cent; nickel, 4.25 to 4.75 per cent, and chromium 1.40 to 2.25 per cent.

To obtain a complete white structure when cast in sand molds, the silicon content will have to vary with the thickness of the castings, and the total carbon content—silicon content decreasing with the increase of total carbon and with increase of section thickness. With a total carbon content of 2.75 per cent, the silicon content for a ½-inch section should be 1.25 per cent; for a 1-inch section, 1.15 per cent; and for a 2-inch section, 0.85 per cent. With a total carbon content of 3.25 per cent, the silicon content for a ½-inch section will be 1.10 per cent; for a 1-inch section, 1.00 per cent, and for a 2-inch section, 0.70 per cent. Since that alloy iron may be made easily in the cupola, there is no necessity of employing a crucible furnace unless you are going to melt only a small amount of metal at one time. In that case, if your crucible furnace is oil fired, or gas fired, it will serve satisfactorily. Coke fired pit furnaces usually do not work so well since it is more difficult to obtain the higher temperatures desired for melting iron. We do not believe that a silica wash will be required if your present sand is satisfactory for the usual run of gray iron castings, since the alloy iron is poured at temperatures in the range known as good hot iron.

Chills Do Not Have Sufficient Life

We are making chilled liner plates for cement mills, and are having difficulty in that the chills against which the plates are cast do not stand up very long due to cracking. They are made from a heat resisting iron and are 2½ inches thick.

While we do not know the thickness of the liner plates you are making, we believe that they are almost the same as the chills you are using, and your trouble arises from that fact. The chills must be considerably thicker so that they do not heat up to the point that disintegration through structural changes occurs. Our suggestion would be to take some of your present chills in good condition and bolt them to ordinary iron chills of the same thickness. Perhaps it may not be necessary to bolt them together, except that they will be easier to handle as one piece rather than two.

Use the combination chill with the heat resistant surface up to gain the benefit of that characteristic. If the 5-inch chill gives a deeper chill on the liners than is desired, decrease the thickness of the ordinary iron chill a little at a time until you secure the proper relationship. When new chills have to be made, then you can cast them in one piece since you know just how thick they should be.

Iron Shrinks Under Feeding Heads

We find shrinkage under the risers on a ½-ton fly wheel poured from the following cupola mixture: High silicon pig iron 480 pounds, steel scrap 160 pounds, cast iron scrap 960 pounds, manganese briquets 2. The metal is poured through a 3-inch pop gate on top of the rim and fed through two 6-inch diameter risers. We have placed the risers on top and also on the side but the shrinkage persists.

You do not state whether the hub is united to the rim by a web or arms. In some instances this feature must be taken into consideration when planning a method for feeding the casting. However, all fly wheels are alike in that the heavy rim is the last part of the casting to solidify. It serves as a feeder until the arms or web freezes. After that the rim gradually solidifies from the outside to the center. Where no risers are present the shell is fairly uniform and the final cavity, if one develops, is at or near the center of the rim where it remains unseen and where it does not affect the appearance or utility of the casting.

Unfortunately the action is erratic to some extent and cannot be relied upon in all cases. Sometimes the upper shell does not congeal as rapidly as other areas and as a result, depressed areas or actual cavities appear on the cope surface of the casting. Risers or feeding heads are placed on castings to prevent this form of defect. Obviously the function of the feeder is to supply liquid metal during the period the metal in the casting is shrinking while passing from the liquid to the solid state. If the metal in the riser freezes first it has failed to fulfill the function for which it was intended.

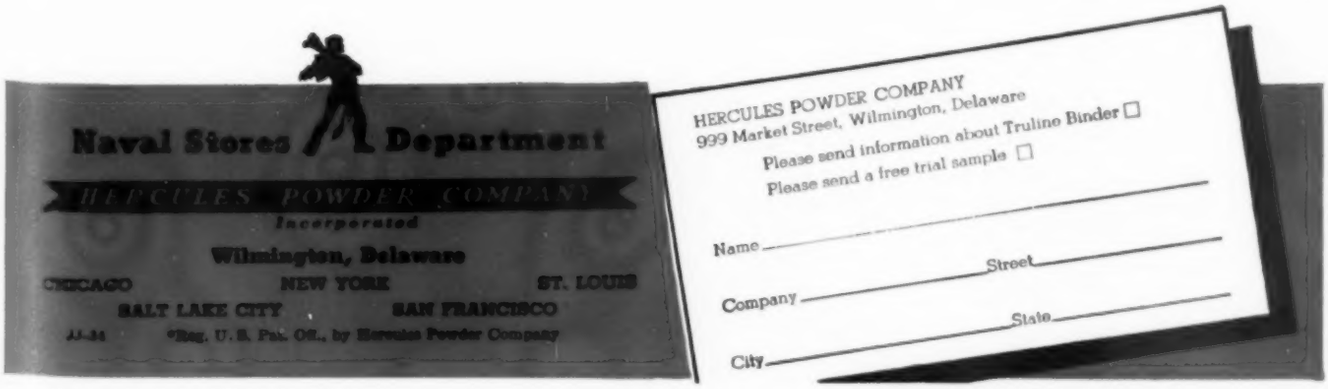
Three alternative methods are practiced to overcome local shrinkage. Size of the risers is increased. Size and number are increased. Risers are fed with rods. In every instance the metal in the riser is covered with blacking or other insulating powder to conserve the heat. One of the most important features is to have the body of sand as thin as possible between the neck and the body of the feeder. Specifically in the present instance we suggest three feeders 8-inches diameter and 8 inches high above the neck. Each of these to be touched up with hot iron and fed with a rod until the metal solidifies.

This low-cost material can be purchased so economically, and used in so many ways, it's no wonder that so many foundries are saving money.

With this one versatile material, you can make accurate cores that collapse completely, give them a smooth wash, and face your molds, too. Thus, you get sound castings that are clean, smooth, true to pattern.

For Truline Binder* is used as a core binder, a binder in core washes, and an ingredient of mold-facings. It is easy to handle and mix, bakes and dries surely, and resists the cutting action of hot metal. It burns out completely, reduces cleaning costs, and cuts down rejects due to cracks or scabs. Particularly important is its binding action and easy drying in cores containing a high proportion of black sand.

Put Truline Binder to work saving money in your foundry. The coupon below involves no obligation. It is merely a request for more information. Mail it today.



MEN of INDUSTRY

B. A. DOLLENS, superintendent of plant No. 6 of Delco Remy division, General Motors Corp., Anderson, Ind., has been named superintendent of the aluminum foundry which is being built as a large addition to be used in the national defense program. EVERETT VINSON has been named his successor.

• • •

W. O. MCMAHON, chief foundry metallurgist, Sloss-Sheffield Steel & Iron Co., Birmingham, recently was elected chairman of the Birmingham District chapter of the A. F. A. Mr. McMahon was born in Sumter county, Alabama and received his bachelor of science and later his master of science degrees at the University of Alabama. He has always been associated with foundry work, being first connected with the U. S. Pipe & Foundry Co. in various plants over the country, also being employed by the National Cast Iron Pipe Co., and the Stockham Pipe Fittings Co. However, for many years he has done research and sales work for the Sloss-Sheffield company. Mr. McMahon has been active in the Birmingham chapter of the A. F. A. since its organization. He has served on several committees of the gray iron section of the American Society for Testing Materials.

• • •

GARNET P. PHILLIPS, chief metallurgist of the automotive foundry division, International Harvester Co., Chicago, recently has been elected chairman of the Chicago chapter of the A. F. A. Mr. Phillips was born in Prairie Creek, Ind., and received his technical training at Rose Polytechnic institute, Terre Haute, Ind., graduating with a bachelor of science degree in 1925 and receiving his master of science degree from Carnegie Institute of Technology, Pittsburgh, in 1926. Immediately after receiving his degree from Carnegie institute he became connected with the Frank Foundries Corp., Moline, Ill. as metallurgist and chief chemist. He joined the International Harvester Co. in May, 1935. Mr. Phillips has been active in the work of the A. F. A. and has presented papers at various of its conventions.

• • •

B. D. CLAFFEY, manager of the gray iron and aluminum division, General Malleable Corp., Waukesha, Wis., recently was elected president of the Wisconsin chapter of the A. F. A. Mr. Claffey began his foundry career at the Spring City Foundry Co., Waukesha, in 1915 working as laborer, coremaker, molder and superintendent until 1928. He then was employed as foundry advisor for the Wisconsin Motor Corp. until 1930. At that time he became works manager of the Milwaukee Gray Iron Foundry Co. and remained there until he organized the Claffey Casting Co. in 1933. He served as president and general manager of that organization until 1936 when it was sold to the General Malleagle Corp. of Waukesha and became the gray iron division of that company. Mr. Claffey has been active in the work of the A. F. A. and recently was elected a director of that organization.

• • •

C. W. FALKNER, 108 East Washington street, Indianapolis, recently was appointed representative of the Chicago Tramrail Co., Chicago, in Southern Indiana and adjacent foundry centers.

• • •

EDWARD P. HAYES has joined C. A. Olsen Mfg. Co., Elyria, O., as vice president. Mr. Hayes and C. A. OLSEN, head of the company, formerly were associated with the Fox Fur-

(*Concluded on page 62*)

W. O. McMahon

Garnet P. Phillips

B. D. Claffey

UNIFORMITY *the Watchword of* WOODWARD

Keenly jealous of the reputation it has earned in the foundry trade for making pig iron of outstanding uniformity, Woodward focuses the complete facilities of its entire organization on that single end. Both production and policies of Woodward are keyed and synchronized at all times to the maintenance of ***uniformity in product*** and ***uniformity in service to the customer.*** Among the factors which account for the uniformity of Woodward iron and Woodward service are:

Uniform ores, with the base ore burden always from the same ore body.
Uniform coke, all from the same coal measure.
Uniform screening and grading of both ore and coke.
Uniform control of humidity in the blast thru air-conditioning.
Uniform policy thru 57 years of making nothing else but pig iron.
Uniform customer service thru established sales agencies in all leading markets.

To you, these factors mean that you can count on Woodward as a uniformly dependable source of supply for uniformly good pig iron.

WOODWARD IRON COMPANY

WOODWARD, ALABAMA

America's Largest Completely Integrated and Entirely Independent Merchant Iron Producer

INDEPENDENT SINCE 1883

(*Concluded from page* 60)

nace division, American Radiator & Standard Sanitary Corp., of which Mr. Olsen was president and Mr. Hayes was in charge of sales promotion.

♦ ♦ ♦

E. W. HEADFORD, formerly associated with Headford Bros. & Hitchins Foundry Co., Waterloo, Iowa, has joined Vilter Mfg. Co., Milwaukee, as assistant to foundry superintendent.

♦ ♦ ♦

FRED J. RYAN, Philadelphia, formerly president of the R-S Products Corp. has formed the Fred J. Ryan Co. to render general furnace and industrial metallurgical service. Headquarters will be at 5244 Germantown avenue, Philadelphia.

♦ ♦ ♦

P. J. CHRISTY was made manager of the Philadelphia office, Chicago Pneumatic Tool Co., succeeding A. M. BROWN who has been transferred to Washington as manager of the branch recently opened there. C. A. DIEHL has been made manager of the Houston, Tex. office.

♦ ♦ ♦

J. A. BUTLER recently was appointed comptroller of the Falk Corp., Milwaukee. Mr. Butler is a native of Minnesota and a graduate of Hamlin university, St. Paul. He became connected with the Falk Corp. 4 years ago after having spent 15 years in the grain business in Minneapolis and Duluth.

♦ ♦ ♦

H. L. BULLOCK, 136 Liberty street, New York, has been appointed representative of the Claude B. Schneible Co., Chicago, in the New York and Philadelphia areas. Mr. Bullock will be assisted by C. B. SMITH of the New York office and FRANK H. SOUTHALL, 316 Kenmore avenue, Glenside, Pa., in Philadelphia.

♦ ♦ ♦

SEWARD E. SHAVER, sales representative of the Werner G. Smith Co., Cleveland, in Wisconsin, Minnesota, Northern Peninsula of Michigan, North and South Dakota, Northern Iowa and Nebraska, recently moved his headquarters from Minneapolis to a new office at Thirtieth and Hopkins road, Milwaukee.

♦ ♦ ♦

CHESTER H. NORTON, purchasing agent, Allis-Chalmers Boston works, recently has been appointed assistant general manager of purchases, Allis-Chalmers Mfg. Co., Milwaukee. He has been transferred to the company's main offices in the West Allis works where he will assist FRED E. HAKER, general manager of purchases for the company.

♦ ♦ ♦

H. E. ARDAHL, formerly chief metallurgist, John Deere Tractor Co., Waterloo, Iowa, recently was appointed assistant to the vice president, Michiana Products Corp., Michigan City, Ind.

LERUE P. BENSING has been appointed representative of the Michiana Products Corp. in the Cleveland territory, with headquarters at 202 Plymouth building, Cleveland.

♦ ♦ ♦

HENRY T. HEALD, for 2 years president of Armour Institute of Technology, was named president of the newly created Illinois Institute of Technology, Chicago. The new institution results from the merger of Armour Institute of Technology and Lewis institute.

♦ ♦ ♦

WALTER C. DAVIS will represent the Tolhurst Centrifugal division and DeBothezat Ventilating Equipment division of the American Machine & Metals, Inc., East Moline, Ill., in Maryland, Virginia and the District of Columbia.

♦ ♦ ♦

CHARLES G. MCCABE recently has been appointed to the technical staff of Battelle Memorial institute, Columbus, O. Mr. McCabe is to assist in the work on the chemistry of the open-hearth steel process. He attended the University of Cincinnati and has had 10 years' open hearth experience with the American Rolling Mill Co., Middletown, O.

♦ ♦ ♦

C. R. HALE recently has been appointed purchasing agent, Air Reduction Co., New York, and its subsidiary and affiliated companies. Mr. Hale is a graduate of Columbia, and joined the purchasing department of the Air Reduction Co. in 1925, being assistant purchasing agent since 1936. He succeeds H. M. DAGGETT, who has retired.

♦ ♦ ♦

SIDNEY ISENBERG, recently graduated in metallurgical engineering, Ohio State university, has joined the research staff, Battelle Memorial institute, Columbus, O. Mr. Isenberg has been assigned to the ore concentration division. He was an assistant in the department of mineralogy at Ohio State before joining the Battelle staff.

♦ ♦ ♦

ROLLIN J. STICKLE recently returned to the Meadville Malleable Iron Co., Meadville, Pa. as superintendent after 15 years of building foundries halfway around the world. Mr. Stickle was born in Coshocton, O., was graduated from the Kenton high school and attended Western Reserve university and Case School of Applied Science. His first position in industry was in the drafting room of the Grabler Mfg. Co., Cleveland, and when that organization built its own malleable iron foundry, he worked on the layout of the plant. When the foundry was completed he became assistant superintendent and in 1918 he resigned to become superintendent of the Meadville Malleable Iron Co. In 1925 he went to Florida where he became a registered architect and practiced until 1929 when he became connected with the Austin Co. Cleveland, in laying out the malleable foundry at Nijni-Novgorod, Russia. In 1933 he returned to the United States and became field adjustor for the N.R.A. During recent years he has been connected with the Conover Engineering Co., Cleveland.

♦ ♦ ♦

FRANK L. DRIVER recently was elected president of the Driver-Harris Co., Harrison, N. J. Other officers elected are as follows: Executive vice president and treasurer, STANLEY M. TRACY, vice president in charge of foreign subsidiaries, JOHN DRENNAN; vice president in charge of sales, F. V. LINDSEY; vice president in charge of manufacturing operation, H. D. MCKINNEY; secretary and assistant treasurer, ERNEST A. HARLEMAN; assistant secretary, MILDRED W. CLARK.

♦ ♦ ♦

T. W. DUNN, after 7 years sales, research and foundry development work with the Foundry Supplies Manufacturing Co., Chicago, has resigned from that position and now is associated with the Great Western Mfg. Co., Kansas City, Mo., and Leavenworth, Kans. He will represent that company throughout the United States and Canada in the sale of Combs gyratory foundry riddles for use in the foundry, paint and other industries.

Program To Feature Foundry Safety

A special program of considerable interest and value to the foundry industry will be presented on Tuesday afternoon, Oct. 8 at the Stevens hotel, Chicago, in connection with the annual congress of the National Safety council. Three leaders in safety work in the foundry industry will appear on the program to discuss important factors relating to foundry safety. The program is as follows:

Presiding, Lamar S. Peregoy, president, Sivyer Steel Casting Co., Milwaukee.

2:30 p.m. Opening Remarks—Introduction of Presiding Officer John H. Holzbog, personnel director, Chain Belt Co., Milwaukee.

2:40 p.m. *Maintaining Safety Interest in the Small Plant*, by L. C. Wilson, general manager, Reading Steel Casting division, American Chain & Cable Co., Reading, Pa.

3:20 p.m. *How To Build a Safety Program for the Small Foundry*, by Peter E. Rentschler, president, Hamilton Foundry & Machine Co., Hamilton, O.

A LITTLE DOES A LOT

Experience in many foundries is proving that good gray iron plus a little Molybdenum will do many an exacting job — and do it economically.

Liners on the steam valve chest of a high pressure pump — a difficult application at best — are a case in point. The manufacturer makes them of good quality gray iron to which is added 1.00% Molybdenum. They are oil quenched and drawn to a hardness of 40-45 Rockwell "C".

He thus meets the difficult requirements for wear resistance at operating temperatures and general reliability, and does it with better than average economy.

A re-study of specifications may indicate similar opportunities in your own production. You will find our book, "Molybdenum in Cast Iron", helpful. It contains complete data on the various Molybdenum irons used in modern foundry practice and is sent free on request.

PRODUCERS OF MOLYBDENUM BRIQUETTES, FERRO-MOLYBDENUM, AND CALCIUM MOLYBDATE

Climax Mo-lyb-den-um Company
500 Fifth Avenue · New York City

MOLY

FOUNDRY DEVELOPMENTS AT SHORT RANGE

RECENT patent describes a procedure of heat treating gray cast iron which is claimed to result in exceptional wear resistance and increased physical properties. Heat treatment is similar to that employed in austempering of steel in that the gray iron heated to a temperature sufficiently high to insure solution of all carbon, is quenched in a molten bath maintained at a temperature from 550 to 750 degrees Fahr., and held for a period ranging from 15 to 30 minutes.

* * *

According to H. Kramer & Co., the 81-2-2-15 alloy is considered a standard casting alloy to match extruded bronze. Slight variations in that analysis may be necessary to meet specific colors. In general, the trend of change in colors is as follows: With increasing zinc, color tends toward deepening of the yellow. With increasing tin, color tends toward whitish yellow, and with increasing copper or lead, the color tends toward reddish yellow.

* * *

Large kettle weighing 23 tons for installation in a chemical plant recently was produced in a Southern foundry. The kettle is 11 feet 6 inches deep, 7 feet 10 inches in outside diameter, with a metal section of 2¾ inches in the body and 4 inches at the flanges. The composition of the metal showed 3.40 per cent total carbon, 1.05 per cent silicon, 0.80 per cent manganese, 0.105 per cent phosphorus, 0.045 per cent sulphur, and 1.10 per cent nickel.

* * *

The A. F. A. bulletin, "Recommended Good Safety Practices for the Protection of Workers in Foundries," states that shop safety committees with a personnel consisting of management as well as workers, is an excellent medium of promoting safe operating conditions. Such committees should meet at least once a month and the personnel changed periodically for best results. Such committees can very well make plant inspections and assist the management and safety inspector in instructing new employes, promoting safety with the old employes, investigating accidents, and the like.

* * *

A recent patent states that addition of small amounts of chromium to a heat treatable cast copper alloy containing titanium and silicon improves the hardness and electrical conductivity so that it may serve more satisfactorily for welding tips. Preferred composition shows 0.9 per cent titanium, 0.4 per cent silicon, 0.4 per cent chromium, remainder copper, but the elements may range from 0.2 to 0.5 per cent chromium, 0.8 to 1.0 per cent titanium, 0.2 to 0.45 per cent silicon, remainder copper. Heat treatment consists in heating at 1650 degrees Fahr. for 1 to 2 hours, quenching in water and reheating at 900 to 950 degrees Fahr. for 16 to 24 hours. Brinell hardness ranges from 105 to 115 and electrical conductivity from 40 to 50 per cent after treatment.

* * *

Recently developed solder in powder or paste form, which does not require any additional flux and functions at a temperature about 650 degrees Fahr., is claimed to form successful joints with aluminum and its alloys, steel, copper, brass, monel metal, stainless steel, zinc, tin, silver, etc. It does not tend to create electrolytic action with the metals it joins, and tensile strength of the joint is high with good ductility.

* * *

A CAST steel ball joint for use on dredge discharge lines, which resists the highly abrasive action of sharp sand, gravel and rocks, contains from 0.4 to 0.5 per cent carbon, 0.6 to 0.9 per cent manganese 0.25 to 0.40 per cent, silicon, 1.75 to 2.25 per cent nickel, 0.60 to 0.90 per cent chromium, and 0.25 to 0.35 per cent molybdenum. Heat treatment consists of heating for 1 hour at 1725 to 1800 degrees Fahr., cooling in air; heating to 1500 to 1550 degrees Fahr. for 1 hour and again cooling in air, and then heating to 1150 to 1250 degrees Fahr. for 1 hour and cooling in the furnace. Inside wearing surface of the socket is flame hardened to 550 brinell minimum with ⅜-inch minimum penetration.

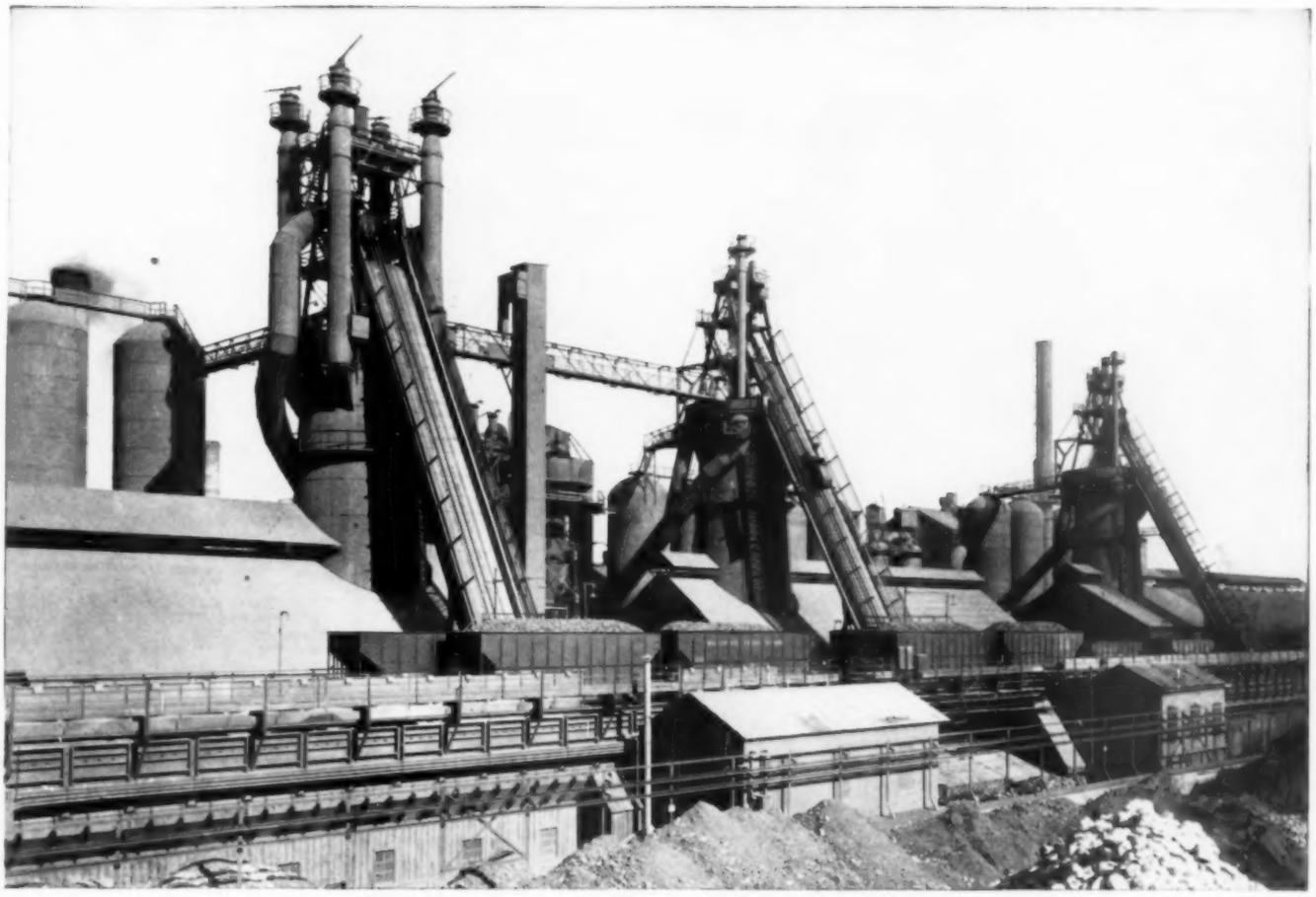
* * *

ACCORDING to the "Code of Recommended Good Practices for Metal Cleaning Sanitation," published by the A. F. A., all abrasive blasting equipment and auxiliary appurtenances shall be connected to exhaust systems and the minimum air velocity in any branch pipe or header pipe shall not be less than 3600 feet per minute. Such exhaust systems shall be designed in accordance with the rules and engineering data prescribed in the A. F. A. *Recommended Good Practice Code and Handbook on the Fundamentals of Design, Construction, Operation and Maintenance of Exhaust Systems.*

* * *

An aluminum alloy recently developed shows a tensile strength from 30,220 to 31,000 pounds per square inch, and an elongation from 7 to 8 per cent without any heat treatment being required. In addition it is said to possess fine grain, resistance to oxidation and corrosion, good machining characteristics, and suitable hardness. Composition range given in the patent indicates 93.30 to 93.70 per cent aluminum, 0.5 to 0.30 per cent titanium, 1.50 to 2.00 per cent copper, 1.50 to 1.75 per cent tin, 0.75 to 1.00 per cent zinc, 0.90 to 1.00 per cent zinc, 0.90 to 1.00 per cent magnesium, 0.20 to 0.25 per cent chromium and trace to 0.40 per cent iron.

ALWAYS ON CALL



Blast furnace unit at Wisconsin Steel Works, Chicago

● Wisconsin Steel Company is always ready to handle your pig iron orders promptly. The orders may be large or small; they may be urgent or routine. But of this you may be sure: you will like the efficient way Wisconsin Steel fills your orders.

If you are a regular customer, you have come to appreciate the uniform, dependable quality of Wisconsin Pig Iron. If you have never used our product, we urge you to get acquainted with it. Manufacturers of quality castings in every line of business are finding that it meets their needs exactly.

We suggest that you try Wisconsin Pig Iron soon. It is "Better Controlled from Mine to Mold." The skill and experience of practical foundrymen and trained metallurgists stand behind every pig. The result is a product that is uniform and true, through and through. Inquiries will receive prompt attention.

WISCONSIN STEEL COMPANY

General Offices:

180 North Michigan Avenue Chicago, Illinois

Affiliate of International Harvester Company

WISCONSIN PIG IRON

"BETTER CONTROLLED FROM MINE TO MOLD"

ADVERTISING PAGES REMOVED

THE ADVENTURES OF BILL

By PAT DWYER

Drawings By RICHEY

I SPENT a couple of hours recently," said Bill, "prowling in, around and through a new school building, one of the most elegantly d e s i g n e d, constructed and appointed havens of instruction in this or any other section of the country. I have seen a good many of 'em—from the outside—at one time or another and I still stick to my story."

"Another Marmion, hey?"

"Marmion? Can't seem to place him. Did he carry a card?"

"Certainly he carried a card with dues fully paid up in Local 982 International Journeymen Knight's and Squire's Union of Great Britain and Continental Europe. Touchy kind of a lad. He had a few words on one occasion with a worthy brother named Douglas, first name Angus. 'If you say' sez he 'that I am not peer to any lord of Scotland here, lowland or highland, far or near, Lord Angus, then you Li-i-e!'"

"Brave, fighting words in any language," Bill admitted. "I hope Angus mowed him down. Don't seem to remember either one of these boys. Must have been before my time. Say," and here he eyed me suspiciously, "you ain't hinting—"

"Certainly not," I hastened to assure him, "I merely commented on the similarity of the stand taken by you and the able citizen cited by the late Sir W. Scott. Each of you had a simple straight forward story and each of you was prepared to back it up in spite of the well known place and high water. I often have wondered who invented that saying, considering the mutually antagonistic characteristics of fire and water. However, laying all that to one side, I should like to know what took you into—of all places—a school building."

"Well," said Bill, "I'll tell you. I have not infested one of those places to any extent since I shook the dust of the last one off my little hob nailed shoes at the mature age of thirteen and a half. I figured any further schooling would be a waste of time so I got myself a job in a glass factory and have stood on my own two feet and earned my own living ever since."

"Glass blowing, or just blowing?"

"The answer to both questions, my dear young inquiring disciple, is NO, and do you want to make something out of it? I did not become a glass blower, because after about a year the glass factory folded up and went out of business and the employes scattered here and there like a bunch of young quail. Most of the skilled men left town and secured employment in other glass factories. Many of the boys willingly would have followed, but railroad fares were prohibitive and in those days the art of thumbing had not yet come into existence.

"Necessity and not carefully thought out choice led me to accept a position as apprentice in one of the foundries. In the phrase of the place and period this was known as, 'ketchin' a job.' The gaffer, a graduate of Clydebank and therefore inclined to look down his nose at local colonial equipment, men and methods, said he would make a mow'ther and caster out of me if I stuck around long enough, jumped when he spoke to me, wiped my nose occasionally, and turned up before the whistle blew at 7 o'clock every morning. I had no trouble with the sticking or jumping. In a short time I learned to do without a handkerchief, but I never attained a high degree of skill displayed by the cupola man. He could blow his nose without an instant's pause in his work, and without the use of either hand. Positively uncanny, I give you my word and only equalled by a certain type of show-off little boy on his first bicycle who rides with his arms folded, or nonchalantly applies a comb to a thatch already oiled down as smooth as the hide on a mouse.

They all look Alike to Ye Ed

"The 7 o'clock feature was a particularly heavy cross to bear. For years and years I looked forward to the time I could lay this killing burden aside and sleep for an hour or maybe two or three hours in the morning. Now, when I have the chance of indulging this truly modest ambition I wake up when the first streaks of daylight come through the window and the diabolical bird chorus starts on the outside. One particularly vicious specimen concealed in the branches of a high tree, repeats his monotonous call, three sour notes, over and over *and* over again for hours. Unfortunately, that is for me, but fortunately for him he is not within range of my window, therefore I cannot indulge in a little catapult practice. I have not given up hope. Some day, as what's his name says, between the dark and the daylight I'll hit upon some way of throwing a sprag into his wheel."

"That is no way to talk about our dear little feathered friends. Don't you know they are of great service to mankind. They destroy vast quantities of noxious weeds and insects and," I finished rather lamely, "all that kind of stuff."

"Not this condemned little viper," said Bill. "I don't believe he ever stops either to eat or sleep. He is a kind of a first cousin to Joe McCarthy's donkey who lived at one time in Glace Bay, Nova Scotia. This

(*Continued on page* 69)

(*Continued from page* 66)

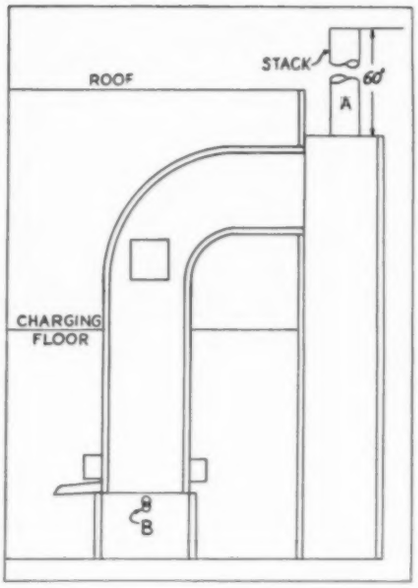
stubborn little beast stopped in the middle of the road one day and refused to move. Joe tried every peaceful method and then proceeded to lay the gad into him. Every person knows that the gad is much more efficacious when accompanied by strong language. Joe had picked up quite a vocabulary from the pit boys who drive the ponies in the mines. These ingenious little rascals—the boys, bless their dear little hearts—spend the time between trips inventing new and horrible forms of imprecation.

"While Joe was engaged with the gad and the proper words, the parish priest came down the road and remonstrated gently. 'Joe,' says he, 'You should be ashamed beating the tar out of an innocent little dumb beast like that. You should treat a donkey with respect. Don't you know that the Saviour rode on a donkey into Jerusalem nearly 2000 years ago?'

" 'Maybe He did,' says brave Joe, 'but I can tell your reverence one thing. If our blessed Lord'—he crossed himself piously—'if our blessed Lord was riding this vicious little divil He wouldn't be into Jerusalem yet!' "

"Maybe He wouldn't," I said, "but I can tell you one thing and that is unless you quit rambling all over the map, you never will reach the little red school house in the dell."

"This is no little red school house and it is not in a dell. The school and grounds I have been told cost $1,000,000. That may not sound impressive in comparison for example with the cost of a capital fighting ship but then on the other hand the school house probably will be doing business for years and years after the fighting ship has been blown to—well, wherever fighting ships are



Cupola stack is bent at right angle

blown to, or has been laid on a shelf, cut to pieces by a crew of wreckers and dumped back into a row of open hearth furnaces. A battle ship is a good deal like an average man's dress suit, costly, handsome and impressive, but in many instances only worn twice, once when the owner is married, and again when the undertaker trims him for the last journey. The navy is a grand institution in many ways, including its function for supporting a vast personnel afloat and ashore, but sometimes I am inclined to string along with old brother Franklin in his story about the whistle. Which Franklin?

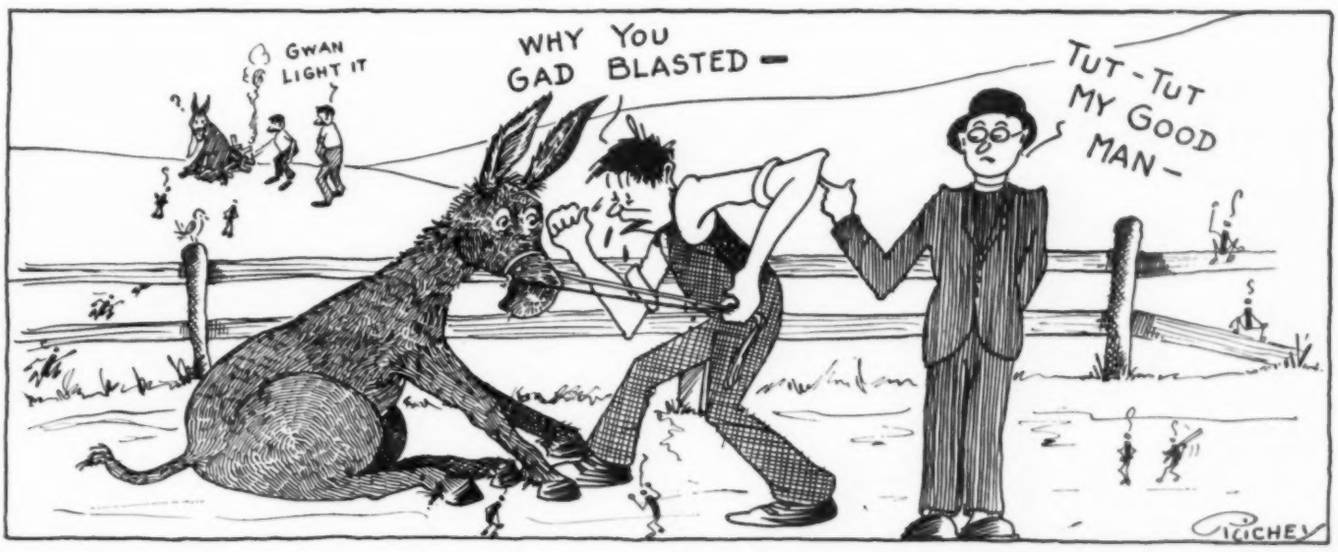
"Sweet mother in heaven," Bill gestured feebly with both hands to indicate that he could hardly believe his own ears. "He asks me: Which Franklin! The old, original blown in the bottle Franklin, all wool and a yard wide Franklin, double willed, and double twilled and double struck in the weaving Franklin, Benjamin himself who knew how to balance his books and was not ashamed or afraid to confess that he had been gypped when he exchanged the contents of his pocket for a whistle.

"You remind me," Bill continued, "of a little anecdote I read some place recently about an old time advance agent for the great Barnum and Bailey—Ringling Bros. circus. He jauntily entered a newspaper office and announced his connection and the further information that the giant and colossal aggregation positively would show in the town on a certain date. The newspaper guy says 'What show did ye say ye was with?' The advance agent was deeply pained, astonished, chagrined and what have you. 'What show am I with, says you. Listen, brother. If you was over in Trafalgar square in London, England and you heard the band playing and the people singing *God Save The King*, would you be silly enough to ask some one which King?' "

"My interest in kings," I admitted, "never of what you might call a robust character practically evaporated after I became old enough to read some of their histories. At the rate they have been pushed off the stage or into the dog house in recent years, the office of royalty is not one to excite either envy or admiration. You need not tell me any more about the Franklin family or the circus. However there is still one item on which I crave a little information."

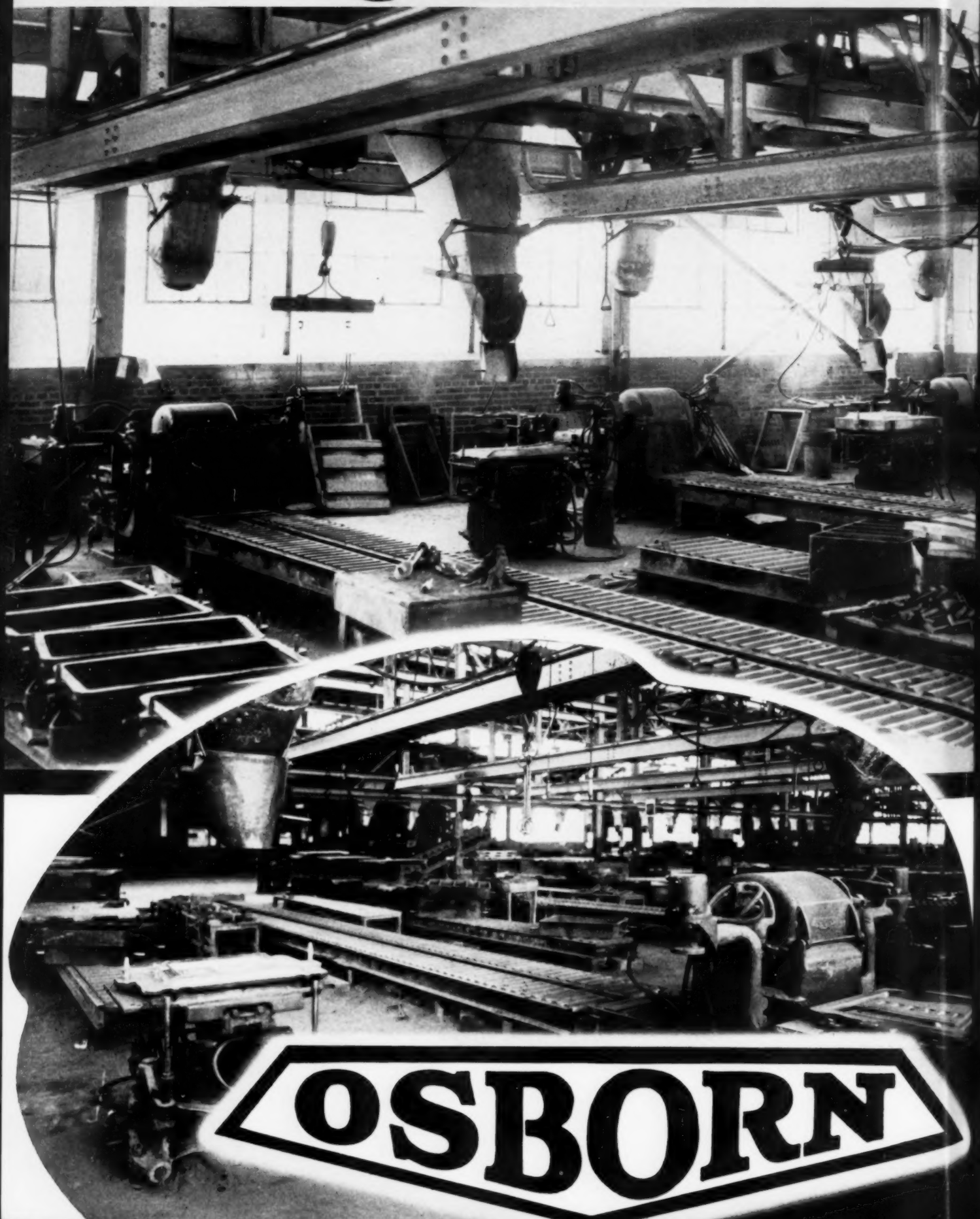
"Shoot, my boy. You know me. Willing William I was known as when I was a boy. Always anxious to share what I have with others. Still the same obliging old indi-

(*Concluded on page* 74)



Maybe a glance from the human eye would have more effect than pithy extracts from recent slimy works of fiction

QUANTITY



PRODUCTION *with* Diversified Patterns

Above—view showing portion of Marshall Stove Company's modern foundry using No. 243 Osborn Jolt Rockover Pattern Draw and No. 559 Osborn Jolt Stripper Moulding Machines.

•

Below—close-up of one pair of machines. No. 559 Osborn Jolt Stripper (left) and No. 243 Osborn Jolt Rockover Pattern Draw (right).

The Marshall Stove Company, Lewisburg, Tenn., produces important quantities of different types of high grade castings. Speed with flexibility is essential to obtain mass production of top quality moulds from diversified patterns. Osborn Moulding Machines were chosen for Marshall's new foundry because they best met these requirements.

Drag moulds are produced on Osborn Jolt Rockover Pattern Draw, and Cope moulds on Osborn Jolt Stripper Machines. Working in pairs these machines are equipped with all the latest operating features including air clamps, air lock on leveling mechanism, and rollers for transferring the moulds to the conveyor lines. Both machines are designed to handle a wide range of flask sizes and shapes and to give dependable uninterrupted service in the production of quality moulds at a high rate of speed with maximum economy.

Osborn Moulding Machines are built in sizes and types to meet all foundry conditions. An experienced Osborn engineer will be glad to make a study of your operation. No obligation is involved on your part and it may result in important time and money savings to you. Write for complete information.

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MOULDING MACHINES

DETROIT AMONG FOUNDRIES

By A. H. ALLEN
Detroit Editor, The Foundry

OFFERING of fluid drive as optional equipment on Dodge, De Soto and Chrysler models for 1941 necessitated a number of changes in the Dodge foundry at Detroit, where clutch housings and transmission cases are cast for the entire Chrysler line. To incorporate the fluid drive, a considerably larger clutch housing is required, in connection with which a new and larger transmission has been developed. The latter has a gear case which is perhaps 20 per cent larger than the former design.

It was apparent that iron capacity would have to be stepped up to meet enhanced demands resulting from these new lines. Chrysler has set up a transmission plant capable of turning out 1000 fluid drive units daily, apparently in the belief that one-fourth to one-third of the buyers of new Chrysler, Dodge and DeSoto will specify the $38 fluid drive accessory.

Increase Melting Capacity

Two of the five cupolas in the Dodge foundry have been enlarged 12 inches in diameter, with output now figured at about 21 tons per hour. Two units are operated at a time, one on hard iron and one on soft. Charge for the hard iron runs around 40 per cent steel, 20 per cent borings, 20 pig iron and 20 return scrap. Soft iron charge runs around 50 per cent borings, 20 pig and 30 return scrap.

Continuous pouring is the practice at Dodge, with small receiving ladles running on overhead monorails in a steady train past the cupola spout. Molds of course are on conveyors, separate systems being laid out for different castings. Clutch housings are poured two to a mold and after pouring traverse long cooling conveyors hooded with sheet steel. The new and larger clutch housing casting required complete reshrouding of a cooling conveyor because the larger molds would not pass through the former hoods.

The pouring floor has been considerably cleaned up by the removal of core storage, cores now being carried on overhead conveyors from coremaking equipment on upper floors of the plant. A new automatic shakeout for clutch housings is in process of being installed and should vastly improve the handling of these castings after pouring.

The Dodge foundry is unique in several respects. First, it is a multi-story affair. Sand mixing is carried out on the top floor. Cores are made on second and third floors. The ground floor is the scene of all pouring, shakeout and cleaning operations, while the basement serves for sand storage and conditioning. A long, rotary drier is operated to reduce moisture content of new sand and hold it to a uniform, minimum amount.

Operated by Experienced Men

Secondly the foundry is operated by a group of men, most of whom have seen 20-odd years of service in the same plant. They are familiar with the peculiar problems involved and are capable of adapting quickly the foundry facilities to rapidly changing schedules and demands which are so characteristic of the automotive industry. The plant is located in Hamtramck, the industrial heart of Detroit.

Biggest engine story of the new model year is the introduction of compound carburetion on Buick lines. Two separate carburetors are used, one at either end of the engine and the rear carburetor is arranged to cut in at near full throttle to give a booster effect. Exhaust and intake manifold castings, of course, had to be redesigned completely, to accommodate the two carburetors, each of which, incidentally, is the dual type. The castings caused some trouble in the Buick foundry at first, it is understood, but production problems now have been overcome.

Pontiac and Olds are offering either six or eight-cylinder engines on the same chassis for 1941, the only difference in installation being the position of the forward engine mounting, the rear mounting being at the same place for both engines to avoid any changes in transmission or driveshaft. The Olds 6 engine has the bore increased 1/16-inch to step up horsepower to 100. Increased power was felt to be necessary in the smaller engine if its performance was to be satisfactory in the larger car models.

All new models have now been shown at least to newspaper men and are now being groomed for the New York show this month. Mechanical changes are few. Minor refinements are numerous. More ash trays, more cigar lighters, more gingerbread decorations on fenders, more die cast ornamentation on bodies generally, more two-tone body finishes, more attractive upholstery seem to be the trend. No pronounced trend toward increased or decreased use of cast iron and steel is apparent.

Buick's centrifugally cast brake drums of course are new and are in production currently, but the plant has not released any information about their manufacture. However, it is known, for one thing, that Buick shortly will install a monster storage conveyor to transfer drums from the foundry to the machine shop. The line will accommodate 15,000 drums, or enough for over 2 days of peak production, and will carry six drums to the hook.

Apply Pressure To Molds

Briggs Mfg. Co., Detroit, is now in process of outfitting a plant in Cleveland on Taft avenue which in a month or two will commence production of nonferrous castings by the Hagermeyer process. The process was developed in Chicago and some time ago it was shown to a number of Detroit foundrymen with a view to getting them interested in adopting it. Essentially it involves casting under pressure in plaster molds. A special type of plaster, mixed with other material to give permeability, is used, together with special types of flasks and heads which permit forcing metal into the mold under light pressure. Apparently best adapted to the smaller types of brass and aluminum castings, the process is claimed to produce parts to close tolerances and with clean finish, reducing the amount of machining necessary.

Degree of quiet surrounding the Briggs operations suggests that the output may be a part of the defense program, allied either with muni-

(*Concluded on page* 74)

LOOK!..3 Important, New Aids To Foundry Production!

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2 *Economy* CORE PASTING MACHINE

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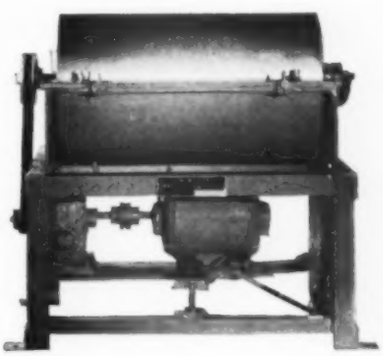

s being used and recommended for he pasting of large and small cores r all types of castings. Savings s high as 50% have been made on asted cores with chambered ports equiring good venting. Higher avings are possible on half-round stock cores, flat slabs, etc. Its use always insures a more even thickness of paste on entire surface of vented half of core, giving additional savings by elimination of scrap castings due to core blows.

3 *Speedmixer*..MOLD AND CORE WASH MIXER

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(*Concluded from page* 72)

tions or aircraft work. The Hagermeyer equipment, according to those who have seen it here, is not sold to users but rented or leased at a price of somewhere around $25,000 per unit. The equipment includes molding and drying devices as well as flasks, pouring attachments, etc.

Ford's six-cylinder engine, now being manufactured in fairly good numbers at the Rouge plant, apparently will not be introduced in the 1941 Ford line at show-time this fall, inasmuch as no mention was made of the new engine at the newspaper preview. It is believed now the new six may be introduced quietly around the first of the year, perhaps in new truck fleets as well as in passenger cars, to determine the public's reaction before the engine is unveiled officially.

Adventures of Bill

(*Concluded from page* 69)

vidual. A man of few words."

"What about the school?"

"Oh, the school. Still harping on that subject, eh? Maybe I forgot to tell you that the foundry has a cupola feature quite a bit out of the ordinary. Seems to me I have read something about hooded and concealed stacks on some European foundry cupolas. Recently a few American cupolas have been equipped with smoke and dust catching chambers, and I have been told about crooked stacks in Case School of Applied Science, Cleveland and Wentworth institute, Boston, but this school cupola is the first one I ever actually saw where the stack is bent at an angle of 90 degrees above the charging door to enter a chimney horizontally for all the world like the smoke pipe of a kitchen stove."

"Am I to understand that the cupola is in the school?"

"Where do you suppose it would be? Out in the yard under an apple tree or behind a lilac bush? Certainly it is in the school, as nice a little foundry as you will see in the town or in any other town. This Cuyahoga Heights school on the southern outskirts of Cleveland has an elementary department, a high school department and a vocational department fitted up with all the necessary equipment to familiarize boys with work in the machine shop, pattern shop, wood working, tin smithing and the foundry.

"Movement to build the school was initiated by prominent executives of plants in this industrial area of the city. All or practically all the students will be absorbed by these plants when they graduate. Cognizance also was taken of the fact that great areas in this district are under glass for raising flowers and vegetables. A model green house is in operation back of the school where the sons and daughters of men engaged in the industry may learn all the scientific ins and outs of plant and vegetable life. Soil conditions, temperature, moisture, natural and artificial illumination, fertilization and all the other factors are controlled to the nicest degree of accuracy. To an ordinary amateur gardener some of the results are truly astounding. In one section they demonstrate the new method of scientific, chemical farming. Fill a box with gravel, sprinkle a small amount of the special goo-gum over it, plant the seeds and almost before one can say fee, fi, fo, fum, tomato plants and bean stalks are shooting up toward the ceiling. Maybe there is something in the old Jack-and-the-Beanstalk story."

"Well," I pointed out, "at least the sterling old favorite had a beginning, a middle and an end."

"Old style stuff," said Bill. "Modern stories leave the reader dangling in the air. To slightly paraphrase the old ballad *The Ram of Darby:* It's true, sir and so, sir, and divil a word of a lie, sir, and if you go out to Darby Town—in this instance Cuyahoga Heights, O.—you can see this cupola with the curly stack as well as I, sir!"

Book Review

Proceedings of the Forty-second Annual Meeting, A. S. T. M., cloth, 1344 pages, 6 x 9 inches, published by the American Society for Testing Materials, 260 South Broad St., Philadelphia, $9.

For the first time the American Society for Testing Materials has issued its proceedings in one volume as compared to the previous practice of presenting committee reports in one volume and technical papers with discussion in another. The present volume is much easier to read due to a change in format using two narrow columns instead of one wide column. The first section of the book comprising 546 pages is devoted to committee reports while 755 pages are devoted to technical papers with discussions which were presented at the 1939 annual meeting. The extensive index occupies 44 pages which is divided into subject and author connotations. The section devoted to technical papers presents some 59 papers including the fourteenth annual Marburg lecture by H. F. Moore on "Stress, Strain and Structural Damage." The papers relate to metal, cement and concrete, ceramics, masonry materials, symposium and sheer testing of soils, and miscellaneous materials.

Erie Firm Closes First Century

By Walter Rudolph

Erie City Iron Works, Erie, Pa. prominently identified with the manufacture of engines and boilers, has operated continuously since it was founded as the Presque Isle Foundry in 1840. Succeeding a long line of business executives, Hays Clemens, president of the company since 1925 has guided the affairs of the company through 15 pace setting years and has continued the record of industrial progress dating back to the days before the invention of the telegraph, telephone, electric light, the automobile or the sewing machine.

According to Thomas Sterrett,

Hays Clemens
President
Erie City Iron Works

Erie historian, Bethuel Boyd Vincent, 1803-1876, realized the possibilities in the *Age of Steam* at that time beginning to revolutionize practically every form of industry. He organized a company to operate a blast furnace, machine shop and foundry. The blast furnace long since has disappeared, but the machine shop and foundry are still in operation on a greatly extended scale, supplemented by additional extensive shops where boilers and many other industrial units are fabricated from steel plates and shapes.

Vincent the founder of the business, a financier and private banker, engaged the services of men who had knowledge of metals and machinery, the Himrod brothers William and David, and W. H. Johnson, an expert iron man and engine builder.

During its long career, methods of the plant have kept pace with all developments in the metallurgical and fabrication fields.

Central New York

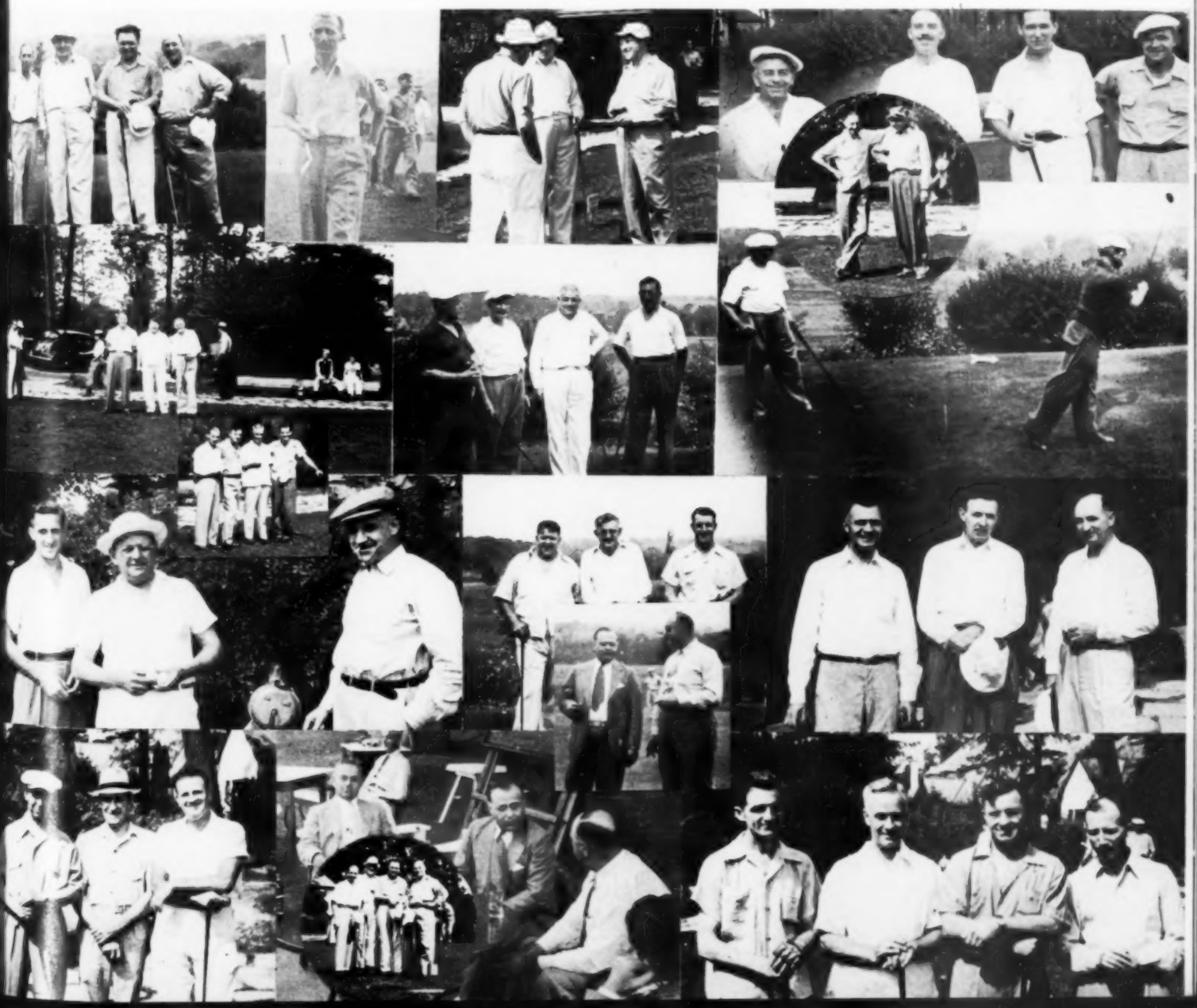
SECOND annual stag picnic of the Central New York Chapter of the A. F. A. was held at the Utica Golf club, Utica, N. Y., with 65 members and guests present. Golf, baseball, horseshoe pitching and other sports were enjoyed during the afternoon. A Southern fried chicken dinner was served at 5 o'clock in the dining room of the clubhouse. Frank C. Wheeler, chairman of the chapter, arranged for the music which was provided both by invited guests and the members of the chapter. A floor show and an exhibition of magic by Bob Thrasher followed the dinner. Committee in charge of arrangements and program included Ed. J. Bair Sr., vice chairman of the chapter, David Dudgeon Jr., Walter Jones, and other members of the Central New York chapter from Utica.—*L. D. Wright, secretary.*

New England

ANNUAL outing of the New England Foundrymen's association was held at the Pomham club, Providence, R. I., Aug. 14. Following the noon luncheon a famous Rhode Island shore dinner was served at 3 o'clock, during which a fine entertainment was provided. Golf and various outdoor sports were participated in by the hundred or more

(*Continued on page* 80)

Views taken at the recent outing of the Detroit chapter. Photos courtesy of F. A. Jensen, National Engineering Co., Detroit



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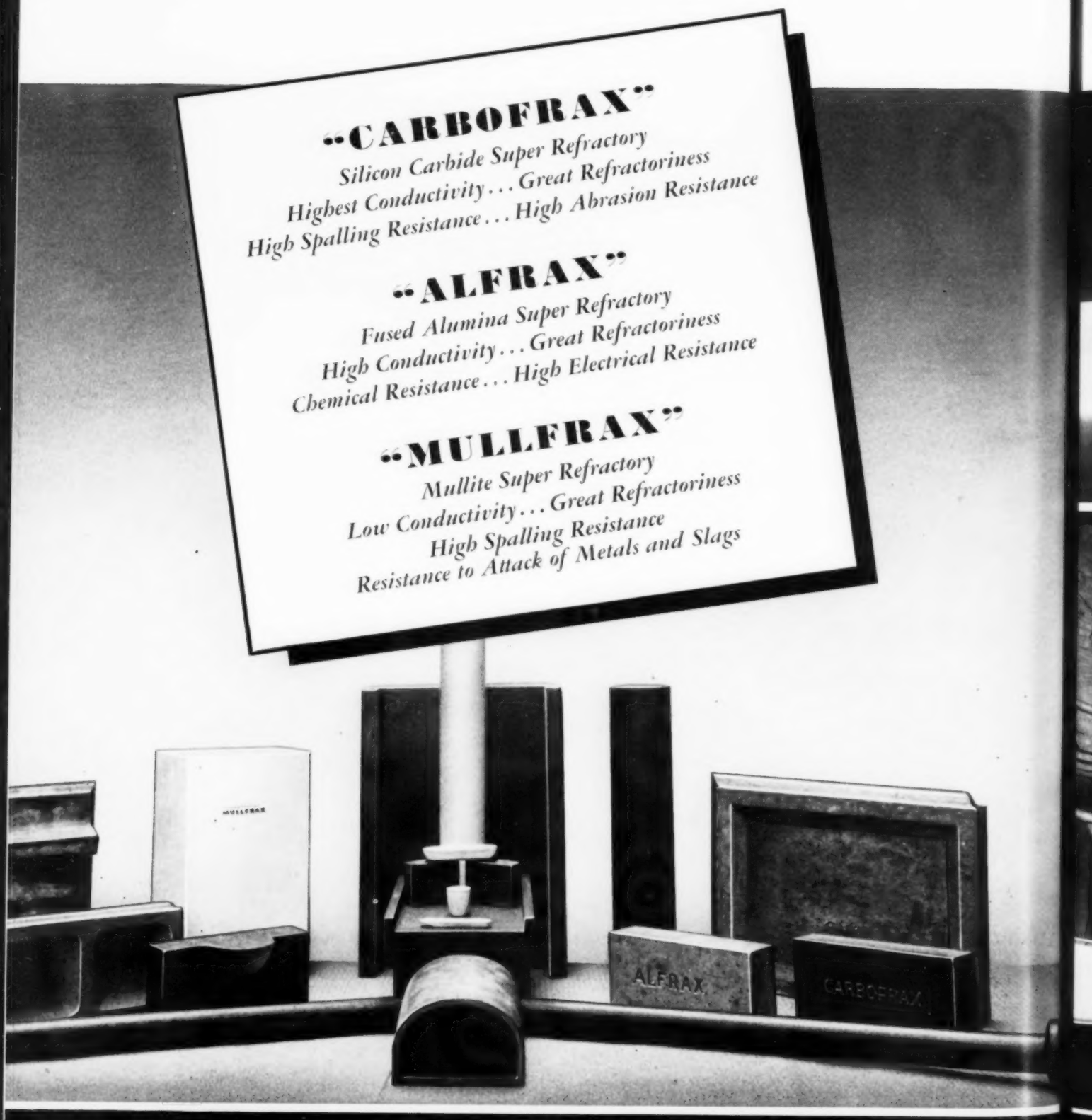
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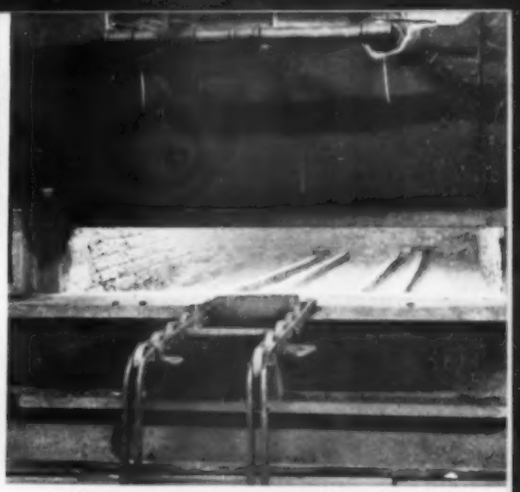

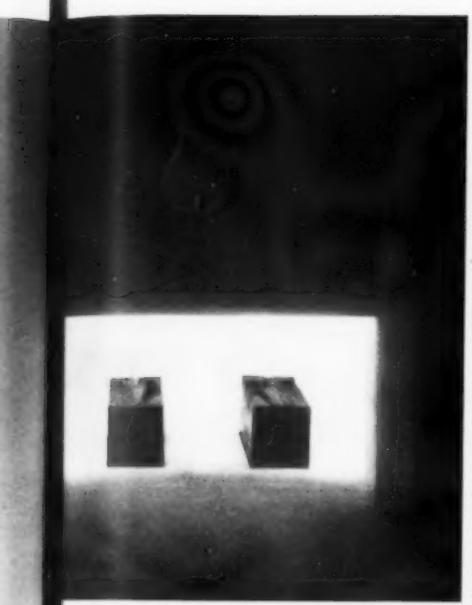

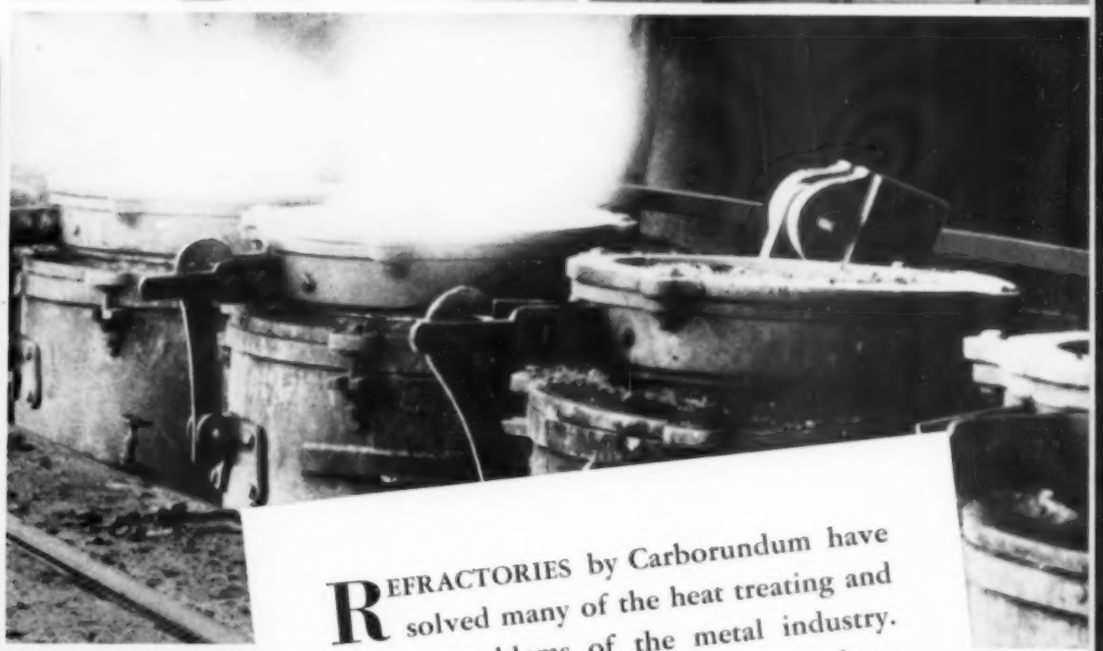

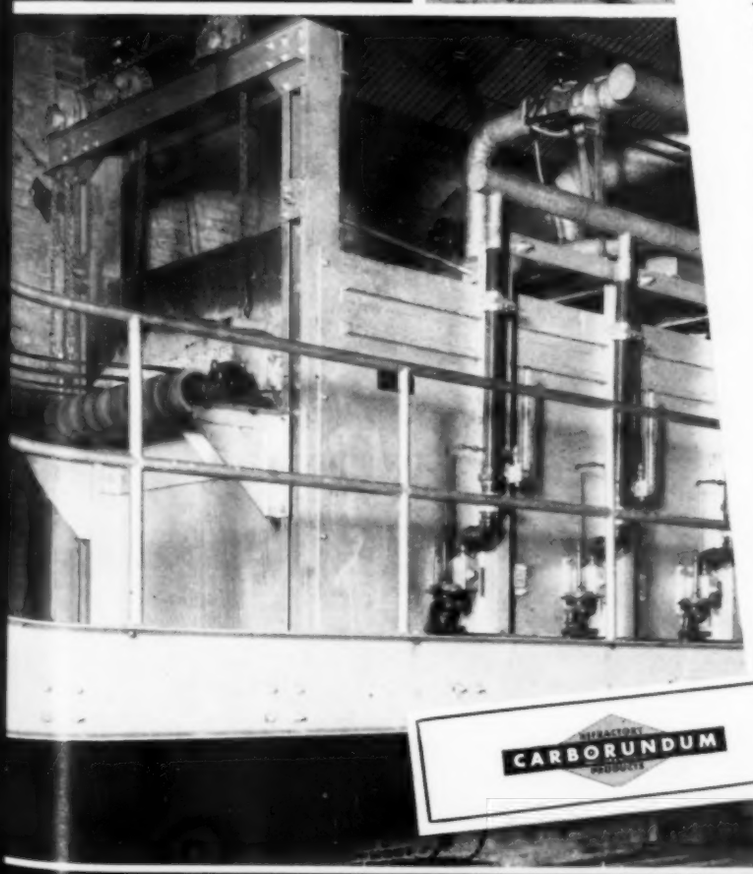

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(*Continued from page* 77)
members and guests who availed themselves of the holiday.

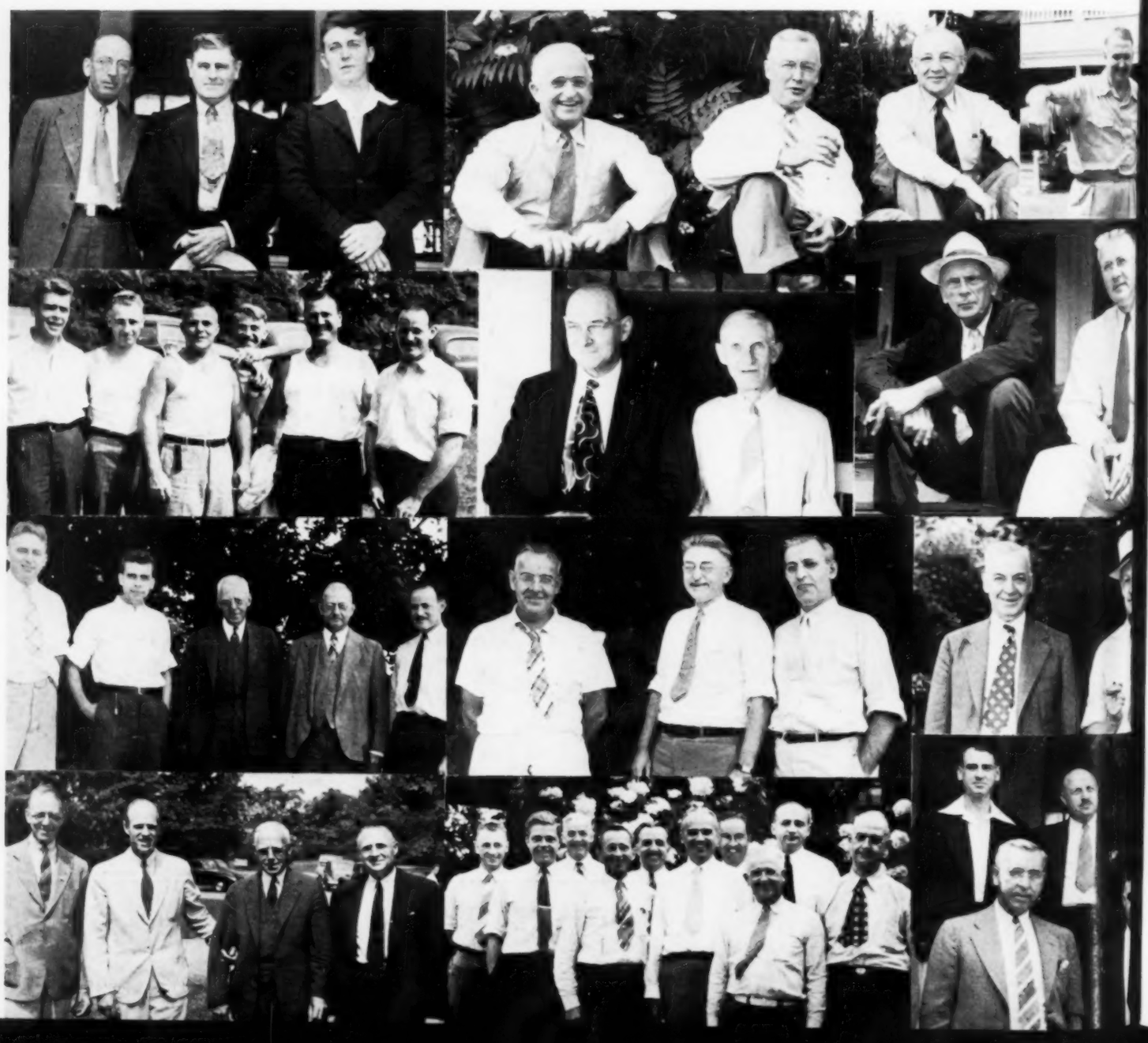
Committee in charge was Charles E. Andrews, Whitehead Bros. Co., chairman; William G. Rich, Providence Gas Co., entertainment; A. W. Calder Jr., New England Butt Co.; Walter M. Saunders Jr.; and A. F. Dockery, H & B American Machine Co.

Regular monthly meeting of the New England Foundrymen's association was held at the Engineers club, Boston, Sept. 11. Following dinner, Francis LeBaron, president of the association, read a communication from the A.F.A. which asked that the members vote on their preference of the city in which to hold the coming 1941 A.F.A. convention. It was found that the preference was Atlantic City rather than New York.

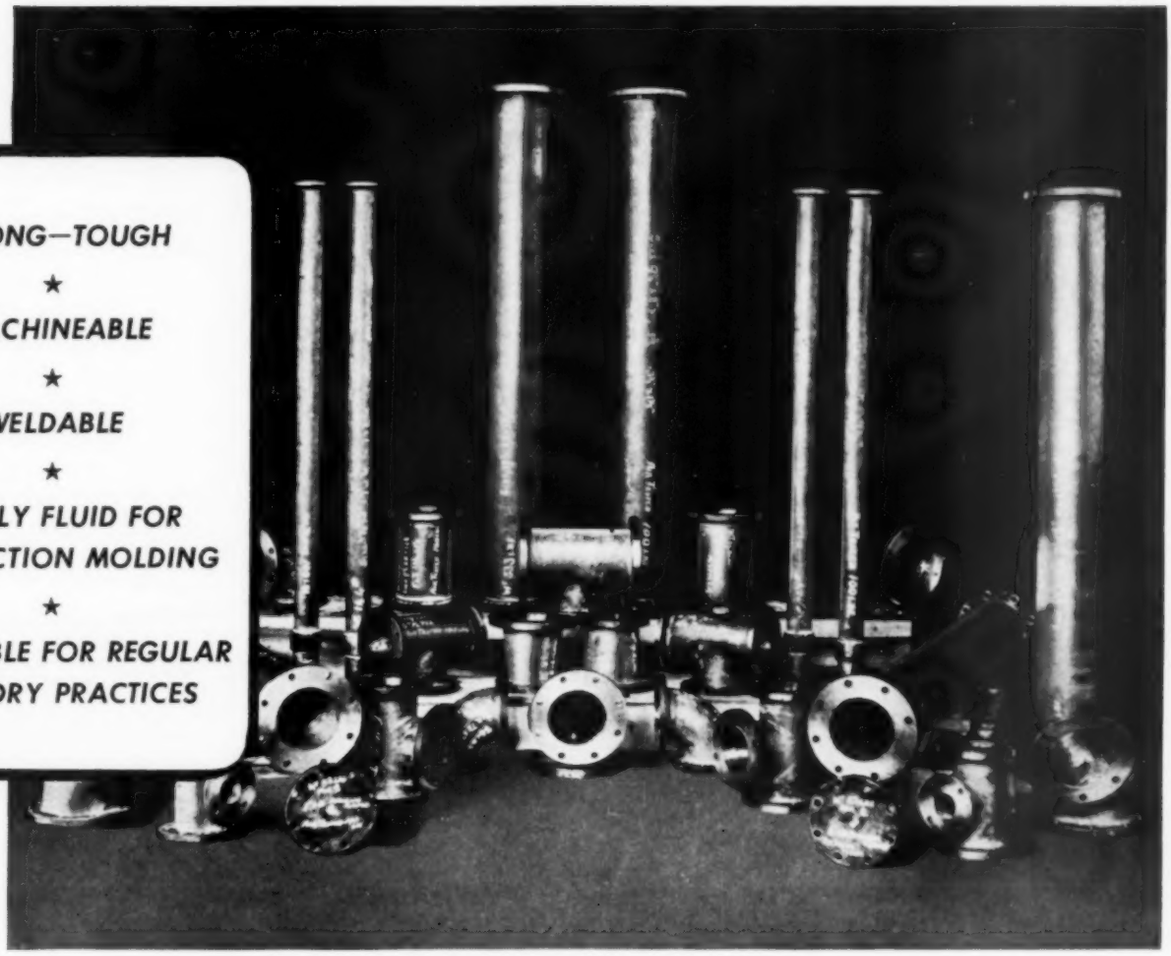
President LeBaron then called on Peter E. Peterson, head of the foundry department, Wentworth institute, who extended an invitation to the New England Foundrymen's association to meet at the institute for their regular monthly meeting in October. This invitation was accepted and the next meeting will be held there Oct. 9, and an inspection of the school will be made. Mr. Peterson said that all departments would be in session at that time. He further explained the apprentice foundrymen's course being presented at the institute at the present time under the auspices of the federal government and the state of Massachusetts. Twenty-two men

(*Concluded on page* 82)

Above and below—A large crowd attended the outing of the New England Foundrymen's association. Photos courtesy of C. A. Wyatt, Debevois-Anderson Co., Boston



Tin-Free Bronze Castings



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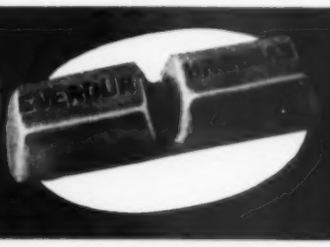

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(*Concluded from page* 80)

are now undertaking the study of all phases of the foundry industry, including mixing and cutting molding sands by hand and machine, and the charging and operation of a cupola. The course has been in progress approximately 5 weeks, and is expected to continue for several more. Six complete heats have been taken out up to the present time by the students and all work in connection with mold and pouring are carried out by them. Mr. Peterson stated that he thought this was the first work of its kind in the country including men of all ages, some being from the WPA. He stated that the purpose of the course is not to present industry with a finished molder or foundryman, but to offer to the foundry industry men who offer possibilities as apprentices.

A 30-minute sound film entitled, "Foundry Progress," was presented through the courtesy of the Modern Equipment Co., Port Washington, Wis. It proved to be most interesting and showed in fine detail the modern equipment of many prominent foundries in this country. Mr. LeBaron expressed his appreciation to Robert Rehm, Whitehead Bros. Co., for their courtesy in obtaining the film. Through the courtesy of the General Electric Co., a second film entitled, "Iron Foundry Progress through the Years" was shown and proved to be interesting, not only from the standpoint of seeing how we used to perform molding operations, but also in showing some of the latest methods of manufacturing molds. Henry Jensen and E. H. Ballard of the General Electric Co. commented briefly on the film.—*M. A. Hosmer.*

Northeastern Ohio

WITH President Ray Fleig presiding, activities of the Northeastern Ohio chapter opened auspiciously at the first fall meeting held at the Cleveland club, Cleveland, on Sept. 12 with nearly 125 members and guests present. The chapter was extremely fortunate in having two national directors present, namely, Henry S. Washburn, Plainville Casting Co., Plainville, Conn., past president and director, and Ben D. Claffey, General Malleable Corp., Waukesha, Wis., chairman of the Wisconsin chapter and A. F. A. director. Both spoke briefly and congratulated the chapter on its activities. Ray Redmond, Buckeye Foundry Co., member of Cincinnati chapter also was present.

President Fleig then read a brief eulogy on the late John A. Penton, founder of THE FOUNDRY, chairman of the board of the Penton Publishing Co., and honorary member of the Northeastern Ohio chapter in which he stressed Mr. Penton's lifelong efforts for the foundry industry.

Main feature of the meeting was the first showing of a new sound motion picture titled, "Sinews of Steel" photographed by the Bethlehem Steel Corp. It depicted the manufacture of wire rope beginning with the ore following the various phases until the finished product emerged.—*Edwin Bremer, chairman of publicity.*

Equipment Makers To Meet

Annual meeting of the Foundry Equipment Manufacturers' association will be held at the Homestead, Hot Springs, Va., Oct. 25 and 26, according to a recent announcement of Arthur J. Tuscany, Tuscany, Turner and Associates, Cleveland, and executive secretary of the association.

The meeting will follow the general plan which has been employed successfully at recent annual gatherings. Both mornings will be given over to business and the afternoon to contact and recreation. The annual dinner will be held Friday evening, Oct. 25 with an unusual program of entertainment.

Important questions to be considered at the meeting include relationship of the equipment manufacturers to the country's defense program; the situation dealing with taxes, amortization of new investments, etc.; and equipment manufacturers' situation with relation to sales and use taxes. Individual executive reports of present and future business conditions will be included on the program.

All manufacturers of foundry equipment are invited. P. J. Potter, Pangborn Corp., Hagerstown, Md. is president and Thomas Kaveny Jr., Herman Pneumatic Machine Co., Pittsburgh, is vice president of the association.

Gray Iron Founders Elect Officers

Annual meeting of Gray Iron Founders' society, held at the Hotel Cleveland, Cleveland, Sept. 12, was devoted chiefly to reports of officers and committees and consideration of future activities. Society members discussed in detail the problem of meeting the requirements of national defense.

The following were elected to the board of dirctors to serve for a term of three years: C. B. Magrath, president, Greenlee Foundry Co. and North Western Foundry Co., Chicago; A. J. Rumley, president, LaPorte Foundry Co., LaPorte, Ind.; B. D. Claffey, manager, General Malleable Corp., Gray Iron division, Waukesha, Wis.; J. H. Pohlman, president, Pohlman Foundry Co. Inc., Buffalo; A. C. Denison, president, Fulton Foundry & Machine Co., Cleveland; A. H. Torrence, treasurer, Indiana Foundry Co., Indiana, Pa. The following will serve for a term of one year: T. I. Curtin, president, Waltham Foundry Co., Waltham, Mass.; W. L. Seelbach, secretary-treasurer, Forest City Foundries Co., Cleveland; R. E. Kucher, vice president, Olympic Foundry Co., Seattle; H. S. Washburn, president, Plainville Casting Co., Plainville, Conn.; R. J. Redmond, secretary-treasurer, Buckeye Foundry Co., Cincinnati; A. E. Hartwell, president, Hartwell Iron Works, Houston, Tex.

At the meeting of the board of directors following the noon luncheon, the following officers were re-elected: President, C. J. Miller, Fremont Foundry Co., Fremont, O.; vice president, Ronald Kucher, vice president, Olympic Foundry Co., Seattle; secretary, John H. Pohlman, president, Pohlman Foundry Co. Inc., Buffalo; and treasurer, Stanley C. Mefford, treasurer, Auburn Foundry Inc., Auburn, Ind. W. W. Rose was re-elected executive vice president, and M. L. Shimer, assistant treasurer.

Reader's Comment

Readers are invited to comment upon articles and other editorial material appearing in THE FOUNDRY. *The editors cannot publish unsigned communications, but at their discretion may permit a writer to use a pseudonym when a bona fide reason exists for withholding his identity. Letters should be brief.*

THE EDITORS

Pounds Added

TO THE EDITORS:

On page 38 of the August issue of THE FOUNDRY, on the subject of monel castings, the statement is made: "If ingot monel metal is used, approximately 1½ *ounces* of metallic silicon should be added for each 100 pounds of metal."

This is an error, and undoubtedly you meant to say pounds per 100 pounds, which would give from 1.25 to 1.50 per cent silicon in the finished product, or a normal composition, inasmuch as the International Nickel Co.'s monel ingot contains less than 0.10 per cent silicon.

It might be well to use the term refined silicon instead of metallic silicon inasmuch as the former is the commercial material generally employed for the purpose.

A. C. MEYERS, Manager
Nickel Department
Williams & Co., Inc.
Pittsburgh

BUILD A FIRE UNDER SLOW SALES

By ERIC N. SIMONS
Sheffield, England

EVERY person who has to sell a range of articles is aware, through experience, that invariably there is at least one line that seems to hang fire and borders on failure. There may be no defect ascertainable in the product itself. The task of obtaining orders sufficient to make the manufacture of a line worth while has to be tackled, and these few notes endeavor to solve the problem.

With castings, the fault often can be laid at the salesman's door. For some reason he fails to push a particular line and neglects to make it prominent among the buyers on whom he calls. He may get plenty of orders for flywheels, armature spiders and tractor links, but his turnover in heat resisting castings or stainless castings may be negligible. In a case of this kind an inquest should be held at headquarters to determine the reasons for apparent failure. As a general rule, the following list includes at least one of the main causes.

(*a*) The salesman dislikes this particular line, and prefers the others.

(*b*) He finds the line more difficult than others to put over.

(*c*) He does not possess enough sales ammunition in connection with the particular product, and is insufficiently familiar with its talking points.

(*d*) He has not selected the talking points best suited to the particular market with which he is concerned.

(*e*) The line does not yield him a commission commensurate with the effort required to sell it, or in comparison with other lines.

(*f*) The salesman does not believe in the product.

(*g*) Minor and technical selling difficulties.

Personal Preference A Factor

A foundry salesman included in his lines manganese steel castings and chrome alloy steel castings for tube mill lining plates. He was an engineer with experience in the crushing and grinding field, and he preferred chrome steel plates to manganese steel. Talking with users, he never could refrain from stating his own preference for chrome steel. He made next to no attempt to sell manganese steel. In this instance cause *a* prevented the sale of a specific type of casting.

Cause *b* may be illustrated by this example. A firm of founders supplied tungsten and cobalt steel magnet castings for a particular type of electrical apparatus. Tungsten steel always had been used because of price, but the better properties of cobalt steel though more expensive, made it the perfect steel for the job. A number of salesmen funked the difficult spade work of persuading the buyer to pay more for the new material. Taking the rose strewn path they did not try to sell cobalt steel castings if they could get the orders for tungsten steel castings quite easily.

Salesmen like to have plenty of information about the castings they sell. The more facts they receive, the more talking points they will discover, and the more easily they are able to draw a buyer into conversation or to bring the castings to his notice. In the brief time granted to them, naturally they will talk about those lines with which they are most familiar, and on which they can talk with a greater show of knowledge. The line they know little about will be evaded, with consequent lack of sales.

Salesman Lacks Training

Cause *d* suggests a defect either in the salesman or in the founder. If a salesman in tropical climes stressed the fact that carbon steel castings do not withstand damp and corrosion, he would make the blunder of concentrating on a talking point that was not a talking point. He would lack ordinary intelligence. While the foundry salesman, if careless or incapable, on occasion may neglect to study his market, and may fail to choose the ideal selling points, this type of error frequently is due to inadequate training of his selling force by the founder.

Sometimes the founder knows the specific demands of the market for a particular line of castings better than some new salesman. The new man, however efficient, may not have the requisite experience with this particular line and its market, and for this reason must not be left to choose the talking points without guidance.

Causes *e* and *f* scarcely need elaboration. Cause *g*, perhaps, can be given more space. In one example, a certain line of castings was not pushed by the salesman for the reason that a sample was too heavy to carry about in comfort. This is what has been termed a minor difficulty of selling. Another typical example would be the possibility of the samples carried becoming broken or spoiled.

It should not be supposed that these seven cover the entire gamut of reasons for the failure of a particular line to 'move.' They are merely the principal causes that affect the salesman and his attitude toward it. On occasion the reasons for sluggishness in the sales of a line are to be found in the castings themselves, in the psychology of the buyer or consumer, or in faulty procedures adopted by the founder. Before going on to consider these outside and inside troubles, it will be beneficial to suggest, briefly, means of overcoming the lethargy of salesmen in regard to particular lines, or of taking away the causes of this lethargy.

Suggest Certain Remedies

To overcome a salesman's personal liking is not simple. The means employed on occasion will savor of the forceful. Usually, the salesman's preference is not founded on actual up to date experience, but on prejudice, conservatism, old-fashioned ideas, or bad training. In the instance mentioned in cause *a* the salesman never had ordered and used chrome steel lining plates. He had picked up the prejudice from the boss under whom he worked in a crushing plant. His enthusiasm for manganese steel liners was produced later by sending him for a period to a plant where a test of both was being carried out, and allowing him to see for himself that manganese steel liners had a definite place.

Another plan which sometimes meets with success, though limited to particular castings and assuming

that the customer needs it is to present a typical casting of the line the salesman is not pushing to one of his best customers for other lines. Try indirectly by convincing this customer of its advantages to conquer the salesman's prejudice. In any event, this plan inevitably causes the product to be discussed with the salesman when next he sees the customer, and he may be led to examine it more thoroughly as a possible selling line.

Another plan adopted by a certain founder was to circularize every customer in the salesman's territory to ask the salesman when next he visited them for information about the product he was suspected of ignoring. That meant that the salesman, notified of the procedure, had to equip himself with facts before he dared go on his round.

If these plans do not succeed, a number of founders demand that the neglected line shall be given preeminence, whether the salesman likes it or not. On certain specified days they shoot him a savage line if he has sent in no orders for this particular type of casting. It is a risky procedure, only to be used as a final shot, but on occasion it may prove effective, if only for the reason that the salesman perceives that his employer is serious in desiring to push the line in question.

Where certain castings definitely are more difficult to sell than others, it becomes principally a matter of raising the salesman's reward to a figure commensurate with the work necessary. The possibility of making selling easier by efficient marketing plans, intensive circularizing, advertising, etc., must not be overlooked. The more the buyer knows in advance about the merits of a particular line, the less trouble the salesman will have in selling it to him. This type of co-operation is particularly essential when the castings are new to the market.

Supplying ample data to salesmen mainly is a job for the sales or publicity manager. Some foundries supply their representatives with copies of every advertisement published, so that they are kept in touch with what is being claimed for the castings they sell. Another way of doing the same thing is to send them copies of competing advertisements, with typed notes showing how the various arguments can be countered. Master sets of all existing literature, catalogs, brochures, etc., should be held by each salesman and maintained by the regular provision of new editions.

Train New Salesmen

Inability to choose the correct sales points can be cured, largely by proper training of new salesman, and by the periodical provision of information. If these two points are watched, only gross incompetence on the salesman's part will lead him to pick the wrong arguments.

No cure for cause *e* is provided here. Either the complaint is justified or it is not. The question demands free interchange of opinions between salesman and founder, with a genuine endeavor to meet difficulties and explain the situation. On some occasions the profit on a casting is not enough to make the increasing of commission feasible. The salesman may not realize this.

If the salesman does not have faith in the product, he can be cured. Lack of faith often is caused by prejudice, lack of real knowledge of what the product can do, or a highly pessimistic and skeptical disposition. A valuable suggestion is to take him off the road for a brief period. Give him the chance of studying foundry methods in the works themselves, that he may witness the trouble and time spent in making as fine a casting as possible. Here he will meet the men who are putting their brains and experience and manual craft into the work. They will transmit to him something of their enthusiasm and their belief in the value of the things they make. When he has seen for himself, he should be shown the tangible indications the foundry possesses that its castings are valued. Often a salesman does not realize that although his own turnover for a particular line of castings may be small, the gross sales for the year by the other boys on the road may be so high as to indicate the merit of the line and the possibilities for himself. Facts and data of this type, if they can be given, should be handed on to the men whose orders loiter. Another good scheme is to supply each salesman with copies of users' favorable reports, or testimonials from customers. These will help to convince him that he is not selling a dud line.

Celebrates Installation of Furnace

IN CELEBRATING the installation of a new 1000 pound electric furnace, the Youngstown Alloy Castings Corp., Youngstown, O., held open house at its plant recently for customers and friends of the company. Following an inspection of the plant by the guests, special entertainment and a feed were provided. This is the second electric furnace to be installed by the Youngstown company, and includes electric equipment for operation on a 2300 volt power line. The furnace will be used in the production of a wide variety of alloy castings. J. Trantin Jr. is president of the company.

Lights

Diagnostic Ultra-Lite Co., 170 Broadway, New York, has developed a type of light designed expressly to bring brilliant light at various angles to deeply recessed areas where careful inspection may be desirable or necessary. The light holders, a plastic product, are said to be practically unbreakable. They are hand tooled, carefully inspected and tested. They are made in various shapes with openings in the end $\frac{3}{8}$, $\frac{1}{2}$ and $\frac{5}{8}$-inch diameter. It is claimed light can be brought around 180 degrees. A hook on the end is a distinct asset in retrieving wires, etc. Some of the models are equipped with small magnets. Special forms can be made to order. The handle is a specially designed pocket pen with a telescopic metal sleeve which shields the light source and contains interchangeable reducing bushings into which are screwed the larger lights.

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Abstracts

FROM WORLD FOUNDRY LITERATURE

Internal Stresses

Normalized Cast Iron (Fontes Stabilisees) by A. Le Thomas, *La Fonte*, Paris, France, November-December, 1940.

The author discusses the purpose of the normalizing treatment of castings, namely, the dissipation of internal stresses, to which castings are subject in the cast state. The theory on which such a treatment is based as applied to cast iron, also is considered.

Engineering Cast Iron

Cast Iron for Modern Engineering Applications, by T. Tyrie, *Foundry Trade Journal*, London, England, Feb. 22 and 29, and March 7, 1940.

The author points out that production of high duty cast iron involves close control of raw materials, use of refined pig iron or steel scrap, a wide range of alloy additions, special melting and foundry techniques, and in extreme cases, the application of heat treatment. He describes briefly the Lanz-perlit or hot mold process, and use of inoculating agents such as calcium silicide, nickel and silicon, and ferrosilicon to produce high quality iron. Addition of alloys to cast iron is practiced according to the author to improve the quality of ordinary engineering cast iron without appreciably altering its character, to overcome practical foundry difficulties which limit the extent to which carbon and silicon may be reduced in the search for high duty irons, to produce special materials such as the austenitic and martensitic cast irons which differ appreciably from normal cast iron, and to produce cast irons suitable for heat treatment.

He then goes on to describe the effects of additions of various alloying elements in a general way, and then more specifically. He touches briefly upon melting practice and foundry properties of high duty cast irons, and discusses heat treatment. Final article of the series describes mechanical properties such as hardness and machinability, tensile strength, transverse strength and deflection, impact strength, damping capacity, wear and heat resistance, corrosion resistance, etc.

Tensile Strength

The Tensile Strength of Cast Iron as a Function of the Temperature (Beitrag zur Zugfestigkeit von Gusseisen in Abhangigkeit von der Temperatur) by Dr. F. Roll, *Die Giesserei*, Duesseldorf, Germany, April 5, 1940.

Copious references dealing with the subject mentioned in the title are cited by the author, and the results of his own investigations carried out on a pearlitic cast iron are given, accompanied by curves, tables and a schematic diagram of the test set-up used. In view of the fact, that for most practical purposes the tensile strength above 500 to 600 degrees Cent. is apparently of little importance, no particular attention was given to that portion of the curve. The discontinuity in the temperature-tensile strength curve shown in the A_1—A_2 range is attributed to migration reactions.

Standard Specifications

Foreign Standard Specifications for Gray Iron, by H. Jungbluth, *Foundry Trade Journal*, London, England, Nov. 30, 1939.

In this article the author considers standard gray iron specifications of various countries including United States, Great Britain, Switzerland, Poland, Norway, Czecho-Slovakia, Hungary, Italy, Holland and Rumania. His object is not to draw a simple comparison between the contents of the various standards in tabular form, but to discover the fundamental lines of thought underlying the specifications, and in that way to reveal any unanimity or differences in opinion regarding requirements which a standard ought to satisfy.

Vanadium Additions

Effect of Ladle Additions of Vanadium to Cast Iron (Die Einwirkung von Vanadium-Pfannenzusatze auf Gusseisen) by J. Wisser, *Die Giesserei*, Duesseldorf, Germany, March 8, 1940.

The investigations covered five different varieties of cast iron melted in the cupola, besides a cast iron which had been melted in the same manner but was super-heated for 70 minutes in an oil-fired drum furnace to 1500 degrees Cent. Tests were made of bending properties, tensile strength (the specimens for this purpose were bottom-poured in dry sand molds), hardness, tendency to piping and mold-filling properties, the standard spiral casting being used for this purpose. Scaling and shrinkage tests also were made. Specimens also were cast in green sand molds for determining the carbide-forming influence of vanadium. A table showing the composition of the different test specimens is included.

Chromium and Silicon

Chromium-Silicon Cast Iron, by A. L. Norbury and E. Morgan, *Foundry Trade Journal*, London, England, Feb. 15, 1940.

This article contains a survey of the microstructure, tendency to chill, mechanical properties, and air and oil hardening capacities of cast irons having chromium contents between 0 and 15 per cent, and silicon contents between 1 and 11 per cent. Conclusions from results may be summarized as follows:

(1) One per cent of 69 per cent ferrochromium added to crucible melts increased the chromium content of the resulting cast on an average by 0.6 per cent chromium.

(2) Increasing the chromium content stabilized the pearlite and secondary cementite, and caused white iron eutectic to replace graphite, but did not cause self-hardening or replacement of pearlite by martensite, etc.

(3) In cast irons of normal total carbon content, the chill production action of 1 per cent chromium neutralized the chill reducing action of about 1 per cent silicon.

(4) Chromium increased brinell hardness and reduced machinability. In most compositions it increased mechanical strength and decreased deflection.

(5) As the chromium content increased, the white iron eutectic assumed the form of carbide crystals in a ferritic matrix, instead of austenite globules in a carbide matrix.

(6) Experiments not included in the article showed that chromium raises the freezing point of the white iron eutectic.

Nonferrous Castings

Gating and Pouring Temperatures in Nonferrous Foundry Practice, by J. Laing, *Foundry Trade Journal*, London, England, Feb. 1, 1940.

This article discusses briefly gating and pouring temperatures of such nonferrous alloys as admiralty or gun metal (88-10-2), phosphor bronze, yellow brass, manganese bronze, aluminum bronze, aluminum alloys, and nickel-copper alloys. The author points out that with gun metal the gates should enter the heaviest section, and that while top gating can be used on small castings or large thin castings, it is not recommended for medium and heavy work. Large runner gates, but not too large, are favored. Pouring temperature depends on the mass of the casting and ranges from 1150 degrees Cent. for heavy to 1300 degrees Cent. for small, thin castings.

Phosphor bronze being fluid calls for gating from the top or near the top to assist progressive solidification. With large castings where top running is impracticable, multiple gating should be used. No hard and fast rules can be established for pouring temperatures. For small and medium castings with wall thickness up to ½-inch using low phosphorus alloys, the pouring temperature may range from 1120 to 1150 degrees Cent.; with high phosphorus alloys the temperature will range from 1070 to 1100 degrees Cent. For wall thickness from ½ to 1-inch with low phosphorus the range will be from 1090 to 1120 degrees while with high phosphorus the temperature ranges from 1025 to 1070 degrees Cent.

With manganese bronze and aluminum bronze it is essential that the gates be arranged so that the metal enters the mold cavity at a low point, and free from turbulence or jet effect. Large risers and feeding heads should be provided to accommodate the high solidification shrinkage. Pouring temperature for manganese bronze is about 1000 degrees Cent. which may be varied 50 degrees either way according to size of the casting. For aluminum bronze the average pouring temperature will

(*Concluded on page* 91)

(*Concluded from page* 88)

range between 1170 and 1200 degrees Cent.

Aluminum alloys should be poured as low as possible consistent with obtaining a satisfactory casting. About 700 degrees Cent. is an average value which may be lowered to 670 degrees for massive castings and raised to 780 degrees or so for very thin ones. Nickel-copper alloys should be provided with adequate feeding gates. Difficulties usually are due to the extremely short solidification range, fairly high solidification shrinkage, and extremely high pouring temperatures. Approximate pouring temperature of the 70-30 copper-nickel alloy is 1400 degrees Cent., and that for the 30-70 copper-nickel alloy is 1540 degrees Cent.

Aluminum Alloys

Aluminum-Silicon Alloys, A Survey of Their Properties and Applications, by George Sachs, *The Metal Industry*, London, England, March 1, 1940.

While brief mention is made of the 5 per cent silicon alloy, the article essentially is devoted to a discussion of the 9 to 13 per cent silicon alloy which is modified by the addition of sodium or sodium salts, and a similar one developed by the author containing in addition 0.3 to 0.5 per cent magnesium which is heat treated to obtain desired physical properties. The article discusses the influence of silicon content, effect of iron and titanium, gassing, annealing and quenching, influence of copper, influence of magnesium and heat treatment of aluminum-silicon-magnesium alloys.

Ladle Additions

Influence of Ladle Additions on the Properties of Cast Iron, by E. Piwowarsky, *Foundry Trade Journal*, London, England, May 2, 9 and 16, 1940.

This article describes an experimental investigation on the effects of ladle additions of ferrosilicon, calcium-silicon, titanium-silicon, and calcium-lithium on high and low carbon cast irons melted in the electric furnace and in the cupola. With the electric furnace iron only a slight difference was observed between metal treated in the furnace and in the ladle, and there was scarcely any difference between the effect of ferrosilicon and that of calcium-silicon.

With cupola melts the primary structure of all specimens was pearlitic, and the strongly graphitizing effect of ladle additions could be observed in all. Charge mixtures for some melts would give a mottled region for 1.18-inch bars so that the desired graphite formation must have been produced largely by the additions. No increase in fineness of graphite was observed. Lithium does not appear to exercise any pronounced influence on graphite formation. Ladle additions to hypo-eutectic irons causes the primary structure to assume a dendritic structure with the graphite arrangement passing from a predominantly eutectic or reticular character into unorientated character with uniform distribution of the graphite in the primary structure.

Comparison of tensile strength and transverse strength shows that in the cast of high carbon melts, the influence of ladle additions is scarcely apparent. With low carbon melts the beneficial effect is clearly evident. Extensive tables and graphs are included which give data on compositions, type and quantity of ladle addition, various physical and mechanical properties of the various test bars.

Nonferrous Melting

Melting Operations in the Non-Ferrous Foundry, by Frank Hudson, *Foundry Trade Journal*, London, England, March 21 and 28, 1940.

Hydrogen is the gas which causes most trouble in nonferrous melting, and it should be borne in mind that solubility of hydrogen varies with different metals. For example the affinity of zinc-free bronze for hydrogen is infinitely greater than for 70-30 brass. In fact it is now known that 70-30 brass is relatively immune to hydrogen unsoundness. That is attributed to the fact that zinc added to copper increases the vapor pressure of the alloy, and brasses containing over 15 per cent zinc are relatively fool-proof as far as melting technique is concerned. Experiments by Genders and Bailey prove that zinc loss is lower with oxidizing conditions during melting.

In gun metal melting it is essential to provide an oxidizing atmosphere within the furnace to prevent hydrogen absorption. Presence of copper or nickel oxides provides a practical means for overcoming troubles due to dissolved gas. Black cupric oxide added in an amount equivalent to 1 to 2 per cent of the charge weight, is a satisfactory addition material to be incorporated with the charge while red cuprous oxide equal to from 0.2 to 0.5 per cent of the charge weight can be used for molten metal degasification. Material should be dry when added, and the alloy after treatment with oxidizing media should be deoxidized properly with phosphorus.

Summarizing the various points the author states: (1) Melting atmosphere is of special importance for all the true copper-tin alloys, and this must be oxidizing. (2) A small addition of zinc improves the production and casting quality. (3) Deoxidation with phosphorus should always be practiced after oxidizing before and after the addition of tin. (4) Direct oxide additions can be utilized to counteract the effect of hydrogen pick-up providing the basic furnace charge is free or low in phosphorus. (5) Should the basic charge be high in phosphorus, gas absorption should be minimized by the use of oxidizing furnace atmospheres in preference to a heavy direct oxide addition unless followed by an adjustment to make up for loss in phosphorus content. Use of relatively small additions (0.2 per cent) of red cuprous oxide after the metal has melted assists degasification with less phosphorus loss.

Sand Testing

Sand Testing with Special Reference to Deformation, by W. Y. Buchanan, *Foundry Trade Journal*, London, England, March 14, 1940.

Sand to be tested should be sieved and kept in an air-tight container and placed in a mixing drum during testing to eliminate loss of moisture. Working with the A. F. A. test piece and measuring deformation it is better to avoid variations in rate of loading. The author then goes on to discuss the test piece controversy, and the index of ramming. He describes modifications of tests in general use in the British Isles, and then turns to a discussion of deformation, assessing molding quality of sands, manipulative difficulties, accuracies of duplicates, effect of milling on rock sand, effect of moisture on rock sand, and effect of Colbond additions. The author's conclusions are that deformation is related definitely to the percentage of flowability as expressed by the methods put forward. Deformation should be used as a method of judging mixing efficiency. The deformation test is useful and a good figure for normal practice should be established easily, e.g., 0.025-inch per inch for Scottish rock sand. The A. F. A. compression test is affected by flowability, and this should be taken into account when assessing the value of such variables as moisture, milling, grain size, grain distribution, and bond.

Alloy Cast Irons

Properties of Some Cast Irons Containing Nickel and Molybdenum (Proprietes de Quelques Fontes au Nickel-Molybdene) by Marcel Ballay and Raymond Chavy, *Bulletin* de l'Association Technique de Fonderie, Paris, France, Jan.-Feb., 1940.

Very resistant and quite tough cast irons may be obtained by moderate additions of nickel and molybdenum to cast irons of average or low carbon content. Cast iron specimens prepared in the cupola or crucible were used in the investigations. The report is accompanied by tables showing the hardness, shearing, impact and bending strengths of cast irons alloyed with varying amounts of nickel and molybdenum. Several micrographs are also included. Cast irons containing nickel and molybdenum have been substituted where cast steel or malleable iron was previously employed. Their resistance to shock and deformation is obviously inferior to that of cast steel and a thorough investigation of the conditions under which the cast iron would have to work is advisable before substitutions are considered.

Heat Treatment

Heat Treatment of Light Alloy Castings, by H. G. Warrington, *Foundry Trade Journal*, London, England, May 16 and 23, 1940.

The author divides the heat treatable aluminum alloys in common use in the British Isles into four main groups. The first contains those in which the major constituent is silicon or magnesium silicide, and relies on heat treatment properties on solution and precipitation of the compound magnesium silicide. Those of group II are far more complex and exhibit heterogeneous structures which are apparently little changed by solution heat treatment owing to the presence of hardening constituents of the iron group. The third group represents variants of the binary 4 per cent copper-aluminum alloy while the fourth group contains only one alloy, the binary 10 per cent magnesium-aluminum alloy. The author gives data on the suggested solution and ageing treatments, and discusses causes for cracking and other defects. In addition he describes suitable heat treating equipment.

Endurance Strength

A Note on the Impact—and Endurance Strength of High-grade Gray Cast Iron (Beitrag zur Schlag—und Ermudungsfestigkeit von hochwertigem Grauguss) by E. Piwowarsky, *Die Giesserei*, Duesseldorf, Germany, Feb. 23, 1940.

The most important prerequisites for imparting high toughness against impact in gray cast iron are: Low carbon content, favorable graphite formation and suitable thermal treatment. Through these means the dynamic properties under stresses developing in practical service are improved to an even greater extent than the resistance of the cast iron to heavy impact stresses leading to fractures.

The author concludes from the investigations made, that the specific impact strength is no criterion of the toughness of cast iron, at any rate not if it involves the dynamic behavior at moderate shock impulses approximating normal operating stresses.

Obituary

JAMES F. Hughes, 58, West De Pere, Wis., widely known in the foundry supply and equipment field and in political circles, died at the Mayo clinic, Rochester, Minn., Aug. 9. Mr. Hughes was born in Green Bay, Wis., Aug. 7, 1882, son of James Vincent Hughes, pioneer Wisconsin foundryman who died in 1932. James F. was graduated from the West Green Bay high school. In 1906 he joined the sales force of Frederic B. Stevens, Detroit, and he worked for that company continuously until his death. In his home town, De Pere, Wis., he served for the past 24 years on the school board and for several years on the library board. Active in politics for many years, he was a delegate to the national Democratic conventions in 1920 and 1928. In 1932 he was elected to congress, but on account of ill health did not seek reelection on a second term. Mr. Hughes was recognized as an authority on American and particularly Wisconsin history.

James Hughes

* * *

Robert E. Walsh, superintendent, Pequonnock Foundry Inc., Bridgeport, Conn., died Aug. 23 at his home in that city. Mr. Walsh had been connected with the Pequonnock foundry for 30 years.

* * *

A. Gunnar Meyers, superintendent, Coupler Pattern department, National Malleable & Steel Castings Co., Cleveland, died Aug. 10 in that city. Mr. Meyers was born in Helestad, Sweden and came to this country in 1917. He was associated with the National company for 20 years, and considered an authority on railroad patterns.

* * *

William L. Fewsmith, age 61, manager of publicity and advertising, Robins Conveying Belt Co., Passaic, N. J. died after a brief illness at Port Carling, Ont. on Aug. 15. Mr. Fewsmith joined the Robins company in 1913 as a civil engineer and had been employed continuously in both the capacity of civil and mechanical engineer until 1924 when he was appointed head of the publicity and advertising department.

* * *

James Egan Garner, for the past 5 years general foreman No. 2 foundry, Continental Roll & Steel Foundry Co., East Chicago, Ind., died Aug. 3 in Hammond, Ind. Mr. Garner was born in Grafton, W. Va., and began his foundry career as an apprentice molder with the Gould Coupler Co., Depew, N. Y. in 1902. Previous to his association with the Continental company he was connected with the Canadian Steel Foundries in Welland, Ont., and Montreal, Que.; Dominion Foundries & Steel, Ltd., Hamilton, Ont.; Robert W. Hunt Co., Hamilton, Ont.; Adirondack Steel Foundry Co., Watervliet, N. Y. and Westinghouse Electric & Mfg. Co., Trafford City, Pa.

Foundry Personnel Relations

(*Continued from page* 53)

members of his personnel department.

No personnel supervisor can contact daily 1000 employees, nor 500, nor even 200, and it is not practicable to maintain a staff of sufficient size to do so. Hence, it is necessary that supervisor and foreman become members of the personnel department and take an active part in the work. The day has arrived in industry when the foreman cannot be content with the problems of production only, and he must likewise devote himself to the problems of his men. He must become leader and counselor, and must be the agent through whom the personnel department reaches the individual employe.

Therefore, it has become necessary that personnel work in a given organization should be directed first to the supervisory forces. Every supervisor and foreman should become imbued with the spirit and the purpose of the program. Each, where it is practicable, should serve for a period on the personnel staff actively engaged in this work. By a system of rotation, foremen would return to their production jobs with a new sense of the value of proper human relations and of the responsibility of stewardship.

It might be pointed out that some of the older members of the supervision were not adaptable to such training periods. This is quite true and there are other ways of obtaining their interest. They are encouraged to accept an appointment to one of several committees directing the various employe activities, giving direction to employe educational programs, recreation, athletics, boys' work, religious work, safety program, suggestion awards and other such activities. They are of course coached by the directory in their relationship with their men and with the personnel staff.

The effect of this effort must be felt daily. The employe must be made to sense the organization interest both while on the job and while engaged in employe activities. He must be made conscious of the recognition of his personal individuality and of his contribution to company and employe interests. He does not respond wholeheartedly to mass or group treatment.

No personnel department that employs sufficient staff members to serve all employes and to perform all the tasks involved in company and employe activities will justify its existence. The secret of the success of a program of employe activity is that the employe be allowed to do it himself, but more so, that he be given this opportunity to serve his fellow workman by having a part in the promotion of the program.

Likewise, the secret of the success of the personnel work lies in the co-ordination of the human element in the plant, ever developing the co-operative spirit of both management and men, and the development of that sense of responsibility, one to the other, which is exemplified in the words of the Golden Rule.

This article is an abstract of a paper presented at the 1940 foundry practice conference at Birmingham, Ala.

THE EDITORS

Book Review

ABC of Aviation, by Lt. Col. Victor W. Page, air corps reserve, U.S.A.; cloth; 418 pages 5 x 7½ inches, over 200 illustrations and 13 page index; published by The Norman W. Henley Co., New York, $2.50.

This is a simplified exposition of all types of air craft with condensed descriptions of their basic principles of construction and operation. Text and illustrations cover important recent developments in airplanes and egines, inspection and trouble shooting prior to flight, instruments used for blind flight, ordinary and acrobatic flying maneuvers. The manual is intended as an elementary introduction to the study of aviation for students, mechanics and nontechnical persons seeking a ground work in basic principles of aviation.

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ENDWELDUR Sling Chains withstand the effects of elevated and sub-zero temperature, of moderate impact loadings and of bending and gouging.

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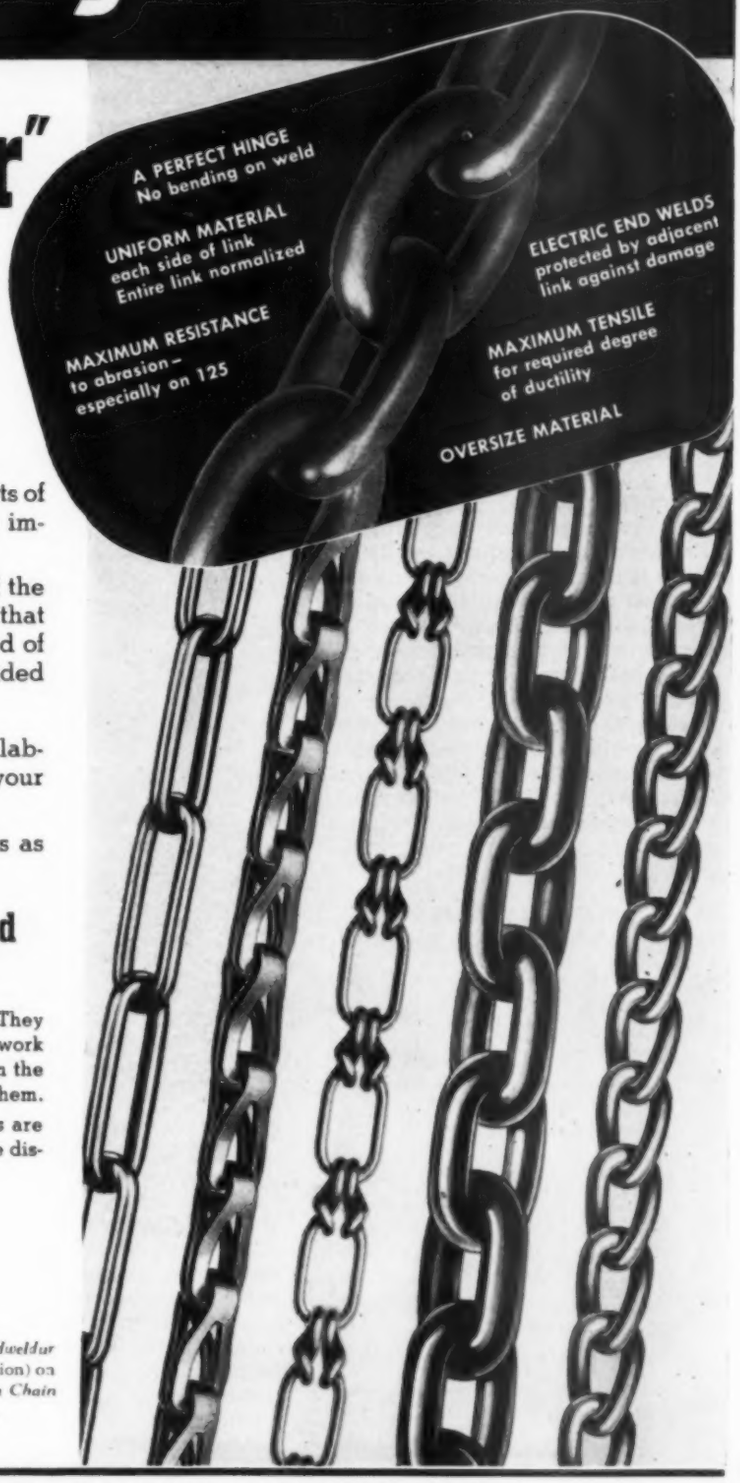

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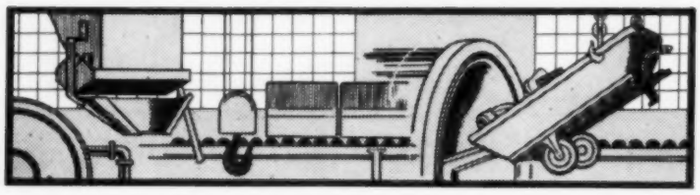
NEW EQUIPMENT



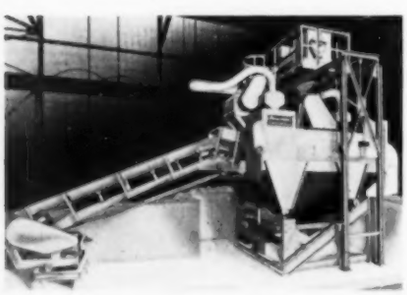
AND SUPPLIES

Pattern Coating

Kindt-Collins Co., 12697 Elmwood avenue, Cleveland, manufacturers of pattern shop supplies and equipment, recently has placed on the market a new component for the regular shellac mixture which it is claimed increases the efficiency of the shellac coating to a remarkable extent. Known as master shellac fortifier it is available in one and five gallon containers for addition to the regular shellac in clear black, chrome yellow, green and aluminum colors. It also is available in ready mixed form for immediate use in the same colors. Announcement by the Kindt-Collins Co., claims that the fortifier increases resistance to abrasion; that it will dry harder in less than half the time required for ordinary shellac; eliminates sand sticking hot or cold; and has much greater resistance to moisture.

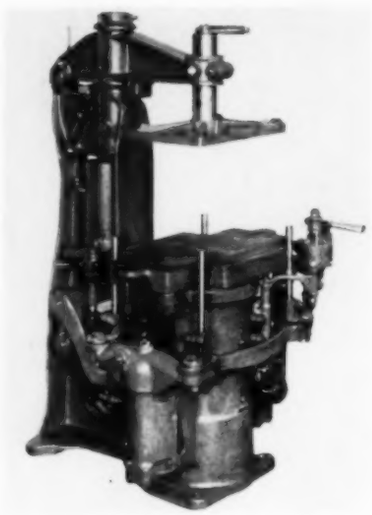
Cleaning Unit

American Foundry Equipment Co., Mishawaka, Ind., has developed a continuous type tumbling unit equipped with airless blast, for use in high production shops. By utilizing a combination of tumbling and longitudinal travel and double width blast it is claimed this machine surpasses in productive capacity any former type. No time is lost in starting, stopping, loading, and unloading this device, available in a wide variety of sizes. It is stated that any conveyor system may be utilized for feeding the mill. Cleaned castings can be discharged either on to a conveyor or into tote boxes. Castings are carried through the barrel on an endless apron type conveyor which constantly tumbles and cascades the pieces thereby exposing all surfaces to the full effect of the abrasive stream.



Molding Machine

Osborn Mfg. Co., 5401 Hamilton avenue, Cleveland has developed a line of jolt, squeeze, stripper molding machines which covers a wide range



of flask sizes and is available with either the new simultaneous vibrating squeeze or the older conventional jolt and squeeze, as shown in the accompanying illustration. Machines are available with 10, 12, 14, and 16-inch squeeze cylinders in the stationary sizes and 10 and 12 inch diameter in the portable type. The general design is of the post type with rotating head beam and supporting rear bracket to relieve the pivot pin of bending stress.

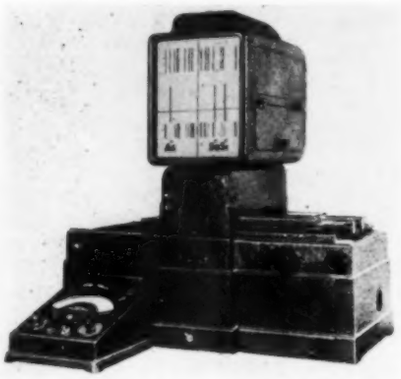
All control valves are below the working plane to permit free access to the front and ends. The squeeze head readily is adjustable for different heights. Adjustable lifting pins and special draw equipment provide unison of movement. Oil type draw control is designed to give smooth, even start of the draw stroke, automatic pick up in speed when the pattern is free of the sand and gentle cushioned stop at the end of the stroke. The post casting is bolted securely to the base and locked in position by an undercut shoulder. Squaring shaft is a one piece steel casting. Draw cylinders are cast separate and bolted to the base. Cylinder bores and draw pistons are ground to final diameters. Squeeze head rotates on a large thrust type ball bearing. Large diameter steel pins and phosphor bronze bushings keep the parts in alignment, guide the squeeze stroke and act as limit pins.

Tote Box Truck

Barrett-Cravens Co., 3250 West 30th street, Chicago, has introduced a simple tote box truck, shown in the accompanying illustration, which it is claimed eliminates back breaking effort, speeds handling and reduces damage to parts. The truck is strong enough to support any weight that can be carried in a tote box 11 x 22 inches. In many instances the boxes can be tiered three high. Arms or prongs are spaced to engage the handles on the standard tote box. A slight pressure on the handle lifts the box. Two wheel suspension provides flexibility that permits jockeying into close quarters, between machines, etc. Special dimension trucks are available for smaller and larger units for tote boxes or pans of unusual size and shape.

Projecting Unit

Harry W. Dietert Co., 9330 Roselawn avenue, Detroit, announces a unit, shown in the accompanying illustration, for projecting accurately and speedily a spectrogram on



a viewing screen and enabling positive spectral lines identification of up to 70 elements. Density of any spectral line easily may be measured with precision by pressing a control button which starts an automatic motor scanning of the spectral line. Density of the spectral line is read from the scale of a meter in terms of percentage of light transmission. With this unit it is claimed spectrograms may be interpreted correctly for qualitative and accurately read for quantitative spectro-chemical analysis. The principle employed in the device to measure the light transmission of a spectral line is to lay the slit on the emulsion side of the photographic plate and move the slit over the spectral line. Light passing through the spectral line enters the slit and then falls on a stable vacuum cell, the output of which is amplified by a two stage compensating amplifier and actuates a quick reading, rugged, large scale microammeter.

Watchman System

Dudley Lock Corp., 325 North Wells street, Chicago, has developed a new watchman's tour system adaptable to every kind of industry. The system is claimed to provide complete mechanical control over the watchman's activities and protects him in case of mishap. It compels the inspection of a property at prescribed time intervals; it can flash or permanently record the time of inspection and summon aid in emergencies. The system includes key stations with transmitting stations at start and finish of each series. The stations can actuate any kind of signal or recording apparatus. A special recording clock sets down on a long roll of paper the date and exact time each station is visited. A delayed alarm gives warning at any specified location where a transmitter box is not visited within a given time period. The watchman's tour key carried inconspicuously in the pocket is an ingenious combination of three separate locks operating only on a predetermined route and only in proper sequence. It has a built in cyclometer which counts the stations visited and thus gives proof of completion of a specified number of tours.

Safety Goggles

American Optical Co., Southbridge, Mass., announces a change in the method of distributing safety goggles previously manufactured exclusively for the National Founders association and sold to members and customers as part of the association service. The association has discontinued this practice and notified its members that future orders

should be placed directly with the optical firm.

The goggles are made in 50 and 45.8 millimeter sizes and provide complete comfort plus all around protection. They are equipped with pliable, snug fitting leather masks, wire screen ventilators around the eye cups, adjustable head bands and can be supplied with lenses for protection against impact, or lenses for protection against both glare and impact.

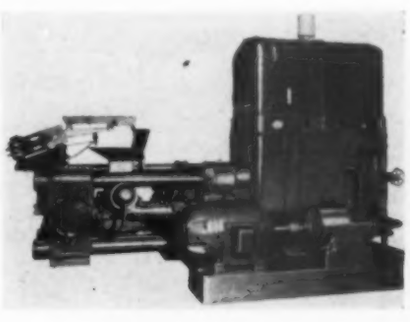
Ventilating Fan

Autovent Fan & Blower Co., 1805 North Kostner avenue, Chicago, has developed an all purpose ventilating fan that provides any normal required amount of air changes. Features include V-belt drive for slower, quieter operation and greater efficiency with 1750 revolutions per minute stock motor than heretofore obtained with special motors. New design 3-blade fan wheel supplies or exhausts unusually large volumes of air at extremely low speeds. It is claimed that large enough volumes of air are handled to do a comfort cooling job.

Briquetting Press

Milwaukee Foundry Equipment Co., 3238 West Pierce street, Milwaukee, announces a new line of hydraulic briquetting presses for handling any type of metal borings and turnings. Former presses were designed for major type operation. The new presses in capacities of ¾, 1 and 2 tons per hour are designed for handling materials on a smaller scale. They are fully automatic and operate hydraulically from a single constant delivery oil pump developing a pressure of 1500 pounds per square inch. A magnetic type feeder equipped with rheostat control flows the briquet material into a receiving hopper. A large main piston propels the ramming tool forward to force a quantity of the loose chips into a die attached to the front end of the hopper. The material is pressed into almost solid form against a massive fixed anvil by the continuing forward stroke of the ram which develops a final pressure of 120 tons.

Full pressure control of the ram through its entire stroke insures a briquet of uniform density. While the briquet is held firmly against the anvil, the independently actuated receiving hopper moves back from the anvil and strips the die from the briquet. Reversal of the ram motion drops the briquet into a chute below the press. The hopper returns to original position with the die face resting against the anvil and the cycle is repeated. Electrical and pressure actuated valves control and synchronize all movements for shockless operation. It is claimed steel turning briquets show a minimum density of approximately 70 per cent. In cast iron the density is at least 80 per cent and in nonferrous metals the density is higher. With steel turnings the cutting oils can be salvaged since the material is squeezed practically dry by the heavy pressure.



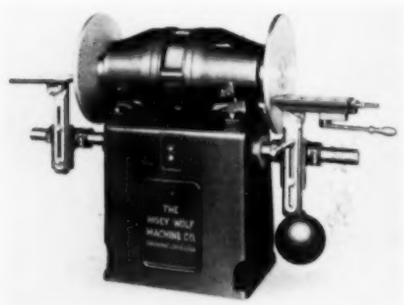
Inspection Light

Sierra Aircraft Co., Sierra Madre, Calif., recently has placed on the market a flashlight bulb extension which can be attached to an ordinary flashlight for examination or inspec-

tion of deep recesses or passages such as encountered in molds, etc. As shown in the accompanying illustration, the extension is made of special wire encased in an aluminum alloy tubing with a standard miniature lamp screw at one end, and a miniature lamp socket at the other. Extensions are made in lengths from 6 to 36 inches, and the tube can be bent to follow curved passages. Largest diameter of the extension, at the lamp socket, is $\frac{7}{16}$-inch.

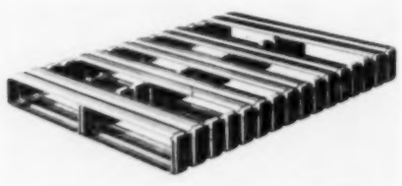
Disk Grinder

Hisey-Wolf Machine Co., Cincinnati, has introduced a change of design in a line of direct drive disk grinders. Extra heavy end bells with feet are employed to carry the bearings directly behind the disks. Bearing construction and lubrication have been improved. Oilers are of the constant level type with sight supply. The motor is totally enclosed with air circulating through the motor, through the end bells into the pedestal and back through the motor. It is claimed this has all the advantages of a totally enclosed motor with the added feature of cooler operation. Machine shown in the accompanying illustration is made in sizes from 3 to 10 horsepower capacity. Guards can be supplied with exhaust connections. Combination machines also can be supplied with disk on one end and a regular grinding wheel or buffing extension on the other side.



Steel Pallet

Union Metal Mfg. Co., Canton, O., recently has developed a new lightweight steel pallet for use with fork-lift and hand pallet trucks. It is claimed that exceptional strength and rigidity are developed by welding corrugated cross members to



the channel members which are shaped to take those corrugations. Construction permits use of light gages steel, preventing weaving and providing necessary load-carrying capacity. The pallet which is shown in the accompanying illustration is $5\frac{1}{4}$ inches overall in height with a 4-inch clearance between deck and bottom. Length and width can be varied to meet requirements. It also can be supplied with a solid deck and bottom merely by adding more cross members.

Crane Lamps

Holophane Co. Inc., 342 Madison avenue, New York, announces a new type crane light which it is claimed withstands the severe service of under crane mounting and lasts a normal life despite the vibration and whip. The unit is installed under the cat walk and is relamped by raising a section of the cat walk floor, or it may be mounted on the edge of the cat walk and swung up for relamping by using an angle section for attachment to the cat walk. It is fastened to the crane by a steel plate $\frac{1}{2}$-inch thick and 10 inches diameter. Weight of the unit is suspended from this plate by three compound double acting steel springs similar to automobile valve springs. The springs absorb shock up and down and in any lateral direction. Good practice is represented by spacing the light units across the crane on 20 foot centers.

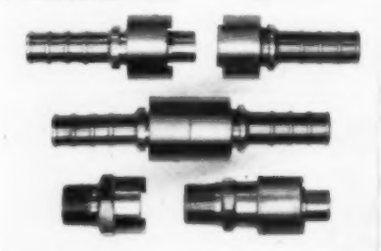
Lighting Unit

General Electric Co., lamp department, Nela Park, Cleveland, announces development of a new two-tube fluorescent luminaire designed especially for industrial areas. The

fixture, shown in the accompanying illustration, is a self-contained auxiliary mounted on a porcelain enamel reflector. It is rated at 200 watts and operates two 85-watt tubes, each 58 inches long, which have a combined initial rating of over 8000 lumens. Mounted on 10-foot centers this new unit, it is claimed, will provide adequate illumination. Lamps are available in two colors, the original blue-white tube and the new white. The latter, developing a color equivalent of approximately 8000 Kelvin is designed to satisfy needs in industry where color is a prime factor. The new white tube is interchangeable with blue-white tubes on all Cooper-Hewitt fluorescent lamps.

Hose Coupling

Pittsburgh Brass Mfg. Co., Pittsburgh, has developed a new line of cast bronze hose couplings for joining similar or dissimilar sizes of rubber hose on air, water, steam and gas lines operating up to 200 pounds per square inch pressure. In addition to quick opening and closing features the new hose couplings employ a positive locking device thus assuring complete safety to workmen. When connection is made the lock spring cannot escape from the sleeve to cause possible accident. Accompanying illustration shows male and female hose couplings ready for connection and also connected. The illustration also shows male and female pipe ends. Standard sizes are available for $\frac{3}{8}$, $\frac{1}{2}$ and $\frac{3}{4}$-inch hose. Larger sizes are built to specification.



THEY ATE THEIR FOOL HEADS OFF

on SUNDAYS *and* HOLIDAYS . .

"And so," the truck salesman of an earlier day would urge, "buy a truck! It costs you not one cent while not in use. Your earnings aren't consumed by your overhead. A truck doesn't 'eat its head off', as horses do." . . . The same principle applies to the sleek, streamlined truck of today and many other situations. Including the present one.

* * *

THAT sales talk, Mr. Foundryman, contains a moral for you. To establish an experimental department of your own would probably be a very expensive move. To equip it, maintain it, and keep it busy would be "quite some job". It would just about "eat its head off". Why invite such an ordeal when *SPO offers you the equivalent?*

The "equivalent"? Yes, sir—exactly that! For now the third month in a row, SPO invites you to adopt our plant as your laboratory. Working thus with foundrymen, the SPO staff has helped them to lower molding costs as much as 50%, to reduce scrap in the same ratio, and to step up production as much as 150% per man. These results have been accomplished through study and test and *experience* — experience which guides our procedure with confidence, so that when we finally make a sample casting for your assurance, *it is right*—precisely as you and we want it. We are able to do this because, as foundrymen, we turned out thousands of castings with our own hands before we commenced to build molding equipment.

Production must march! Quality must improve! National conditions—world conditions—demand it. In our own field, castings must come to be better finished, to be more uniform in size and weight, to be no higher in price. To assist you in attaining these ends, SPO again invites you to "annex" our plant to your own *as your laboratory* without cost or obligation.

* * *

SPO designs and builds both molding machines and pattern equipment, and guarantees them to produce castings which will be in accordance with your specifications.

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Manufacturers and Specialists in Molding Machines, Vibrators, and Patterns for Production

East 61st Street and Waterman Avenue • • Cleveland, Ohio

Lighting Unit

RLM Standards Institute, 20 North Wacker drive, Chicago, announces the establishment of a specification for a new 48-inch fluorescent twin lamp porcelain enamel unit. The new specification sets up standards for a new type of lighting unit especially designed for general illumination of industrial and commercial locations. Important features in the specifications include: Porcelain enamel reflecting surface for diffusion and durability; light output efficiency 78 per cent; cutoff angle of 17½ degrees and closed ends to minimize glare; two lamps correctly spaced to insure comfortable and efficient light; a new type underwriters' laboratory approved auxiliary corrected for power factor and flicker; removable and renewable starting switches located in socket to facilitate inspection and maintenance.

Joining Material

Laclede-Christy Clay Products Co., 1711 Ambassador building, St. Louis, recently has introduced a new refractory joining material designed especially to meet conditions encountered in air furnaces, cupolas, electric furnaces and ladles. Economies claimed for this new product include ability to resist slag, molten metal, chemical reaction and extreme temperatures. The new material, which is marketed under the name of Laclede Metaltite, is a finely ground joining material with a pyrometric cone equivalent of 36 (3290 degrees Fahr.) and is said to be low in free silica. It is claimed the material bonds well because of the high plasticity of the bonding clay, but the bond is readily broken when the wall or lining is worn out. The material is shipped dry and is mixed with clean water several hours before use.

Coupling

Falk Corp., Milwaukee, has developed a controlled torque steelflex coupling to provide a means of protecting mechanical drive systems against damage caused by shock over loads. This coupling is claimed to afford protection against peak loads ranging from 500 to 1000 per cent of the normal torques that snap off shafts, damage housings, etc. In addition to the ability to slip under instantaneous high peak loads it is claimed that this coupling also performs the usual features of a truly resilient coupling, damping out shocks, reducing vibration, allowing parallel and angular shaft misalignment, etc. According to the manufacturer the coupling is a mechanical circuit breaker and shock absorber to protect mechanical equipment.

Electric Hoist

Detroit Hoist & Machine Co., 8201 Morrow street, Detroit, has announced a new, compact small electric hoist, designed for either hook or trolley suspension and in lifting capacities ranging from 250 to 750 pounds. Other features include a specially designed, compact housing which encloses gears, bearings

and working parts in oil; cone worm of continuous area contact and set of helical gears; load block totally enclosed safety type with sheave and hoisting ropes guarded; electric solenoid brake; two strands best grade flexible steel wire hoisting rope; fully enclosed conservatively rate, high torque, ball bearings hoist motors for 110 volt, single phase lamp socket plug in current, or 110 and 220 volt polyphase power circuit; push button control; safety limit stop.

Magnetic Separator

Dings Magnetic Separator Co., 675 Smith street, Milwaukee, has developed a drum type magnetic separator for separating magnetic particles from aluminum, brass and bronze borings and turnings. The unit also is used for conditioning foundry sand. It consists of a hopper and a power driven roll, which is highly intensified by a powerful coil. All magnetic particles are attracted and held fast to the surface of the roll until they pass out of the magnetic field. The nonmagnetic materials pass over the roll and are discharged in a normal trajectory.

Regulators

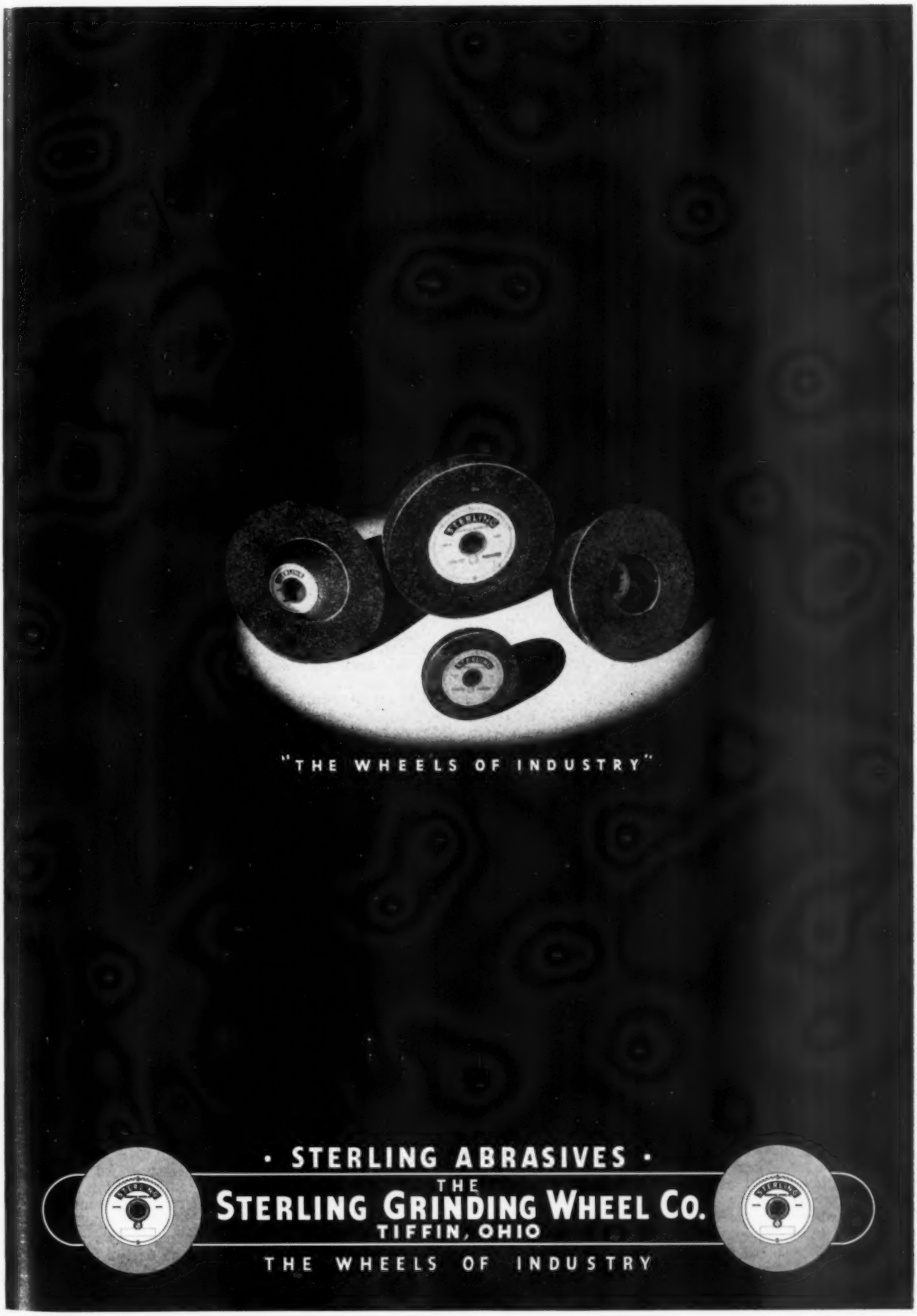
Linde Air Products Co., unit of Union Carbide and Carbon Corp., 30 East 42nd street, New York, announces the addition of three new single stage, general service regulators to its line of welding and cutting apparatus. It is claimed the oxygen regulator for the delivery of oxygen at working pressures up to 200 pounds per square inch, a companion acetylene regulator and the fuel gas regulator feature simplicity of design and reliability of operation. It is further stated they are strongly built and designed to give dependable performance in all welding, cutting and deseaming operations where simplicity of construction and large capacity are demanded, but where the refinements of two stage regulators are not required. In the regulators the valve closes with the incoming pressure thus assuring positive seating action.

Wall Design

Geo. P. Reintjes Co., 2517 Jefferson street, Kansas City, Mo., has developed a new type of construction for insulating sectionally supported walls in unprotected hot zones of boilers or furnaces. In the new design of wall, insulation can be placed between the refractories and horizontal box castings. Thus 90 per cent of the wall supporting metal is outside the insulation. Metal within the insulation consists of individual pieces of limited size. A cooling space or air lane is formed by attaching metal lath and insulation to the outside of the box castings. All castings are concealed and can be cooled and vented without the expense of a metal casing.

Pyrometer Control

Bristol Co., Waterbury, Conn., recently has developed a new electronic pyrometer controller which is said to eliminate moving parts such as motors, depressor bars, etc. in the control circuit. Control in the device is accomplished by an electronic circuit using a single high-output, metal type vacuum tube. A milliameter on the front of the instrument indicates the condition of the control circuit. Pointer of the millivoltmeter movement is not engaged or retarded at any point within its normal operating range, leaving it free to indicate continuously the temperature under control. Measuring unit is equipped with a cold end compensator to insure high accuracy in reading the degrees of temperature recorded on the instrument.


"THE WHEELS OF INDUSTRY"
• STERLING ABRASIVES •
THE
STERLING GRINDING WHEEL CO.
TIFFIN, OHIO
THE WHEELS OF INDUSTRY

Foundry Activities

DELCO-REMY division, General Motors Corp., Anderson, Ind., states a new foundry is being added to the plant to make aluminum castings for the Allison Engineering Co. at Indianapolis, another division of the General Motors Corp. The work is being rushed in an effort to have the building completed by Dec. 15.

* * *

Monroe Steel Castings Co., Monroe, Mich. has let the general contract for a foundry building. Edwin S. Carman, Inc., Cleveland, is engineer.

* * *

Hercules Foundry, Boyle and Slauson avenues, Los Angeles, is building an addition to its foundry at an approximate cost of $1700.

* * *

Atlas Foundry, formerly located at 140 West Root street, Chicago, has moved to 230 West Bloomingdale avenue, Chicago.

* * *

Aluminum Co. of America, 5151 Magnolia avenue, Los Angeles, is constructing a foundry and laboratory building to cost $92,000.

* * *

Fulton Foundry & Machine Co., 7325 Morgan avenue, Cleveland, has built a 1-story addition, 21 x 30 feet for additional core room facilities.

* * *

Aluminum Alloy Casting Co., 2454 East Fifty-seventh street, Los Angeles, is building an addition to its foundry building 27 x 47 feet which will cost $1500.

* * *

Anderson Die Cast Co., 217 East Seventeenth street, Los Angeles, is building a new 2-story plant at 1000 East Sixtieth street, Los Angeles, costing $40,000.

* * *

The Birmingham Acipco team defeated Pittsburgh, Sunday, Sept. 15 to win the "world series" of the National Amateur Baseball federation. The winning team is from the American Cast Iron Pipe Co. at Birmingham.

* * *

Sandusky Foundry & Machine Co., 615 West Market street, Sandusky, O., is building a plant addition to speed production on a naval order and probably will build another addition to increase output.

* * *

Fairbanks, Morse & Co., Beloit, Wis., will expand its diesel engine plant in a $500,000 program which includes erection of a new nonferrous foundry 80 x 220 feet, according to A. C. Howard, general manager. The foundry will triple present capacity and will handle 22 alloys including brass, bronze, high brass, zinc and tin alloys. Plans call for completion in 8 months. O. D. Conover Cleveland is engineer.

* * *

Die Casting Corp. has been organized in Los Angeles with a capital of $50,000. Directors are: Claude B. Andrews, L. K. Link and C. M. Stowell, all of Los Angeles. The organization is represented by Claude B. Andrews, 405 South Hill street, Los Angeles.

* * *

Index of sales of foundry equipment during July, according to the recent report of the Foundry Equipment Manufacturers association, Cleveland, was 194.4 as compared with 164.9 in June. The index is based on the average for 1937-38-39 as 100 per cent.

* * *

College of Engineering, Cornell university, Ithaca, N. Y., recently was presented with new sandblasting equipment valued at more than $3000 by the American Foundry Equipment Co., Mishawaka, Ind.

RAW MATERIAL PRICES
Sept. 16, 1940

Iron	
No. 2 foundry, Valley	$23.00
No. 2 Southern Birmingham	19.00
No. 2 foundry, Chicago	23.00
No. 2 foundry, Buffalo	23.00
Basic, Buffalo	22.00
Basic, Valley	22.50
Malleable, Chicago	23.00
Malleable, Buffalo	23.50
Charcoal iron, furnace	27.00
Coke	
Connellsville beehive premium	$5.75 to $6.30
Wise county beehive coke	5.50 to 6.50
Detroit by-product delivered	11.00
Scrap	
Heavy melting steel, Valley, No. 2	$18.50 to $19.00
Heavy melting steel, Pittsburgh, No. 2	19.50 to 20.00
Heavy melting steel, Chicago, Auto No. 2	16.00 to 16.50
Stove plate, Buffalo	16.00 to 16.50
Stove plate, Chicago	12.00 to 12.50
No. 1 cast, mchy., New York	17.00 to 17.50
No. 1 cast, mchy., Chicago	16.50 to 17.00
No. 1 cast, Pittsburgh	20.00 to 20.50
No. 1 cast, Philadelphia	22.00 to 22.50
No. 1 cast, Birmingham	16.50
Car wheels, iron, Pittsburgh	21.50 to 22.00
Car wheels, iron, Chicago	20.00 to 20.50
Railroad malleable, Chicago	22.00 to 22.50
Malleable, Buffalo	22.50 to 23.00
Nonferrous Metals	**Cents per pound**
Castings copper, refinery	11.00
Straits tin	50.05
Aluminum, 99 per cent	18.00
Aluminum, No. 12 (Secondary, standard)	14.00 to 14.50
Lead, New York	4.90
Antimony, New York	14.00
Nickel, electro	35.00
Zinc, East St. Louis, Ill	6.85

The new unit provides a further addition to the comprehensive plan to make the Cornell foundry a model of its kind.

* * *

Dalton Foundries, Inc., Lincoln street, Warsaw, Ind., recently purchased the Conrad Machine Works of that city. The Dalton company also purchased patents on an automobile lifting jack which previously were held by the Conrad organization. Manufacture of the automobile jacks is to be continued.

* * *

York Foundry & Machine Co., York, Pa., recently has discontinued business and sold its property to the York Safe & Lock Co., York. The gray iron foundry will be discontinued and the facilities utilized in connection with the defense program. The York Safe & Lock Co. will continue to operate the nonferrous casting department under its name.

* * *

Gunite Foundries Corp., Rockford, Ill., recently added electric steel castings to its line of foundry products. When the company began business in 1854, the product was exclusively gray iron. Ten years later malleable iron was added. In recent years products included high test cast iron and pearlitic malleable iron.

* * *

Joshua Hendy Iron Works, San Francisco, recently completed a contract for supplying 40 ring seal gates for the Grand Coulee dam, the gates weighing approximately 150,000 pounds each and were built mainly of gray cast iron. The company now is supplying four tube valves for the Wickiup dam in Oregon, the castings for the valves weighing 17 to 22 tons each.

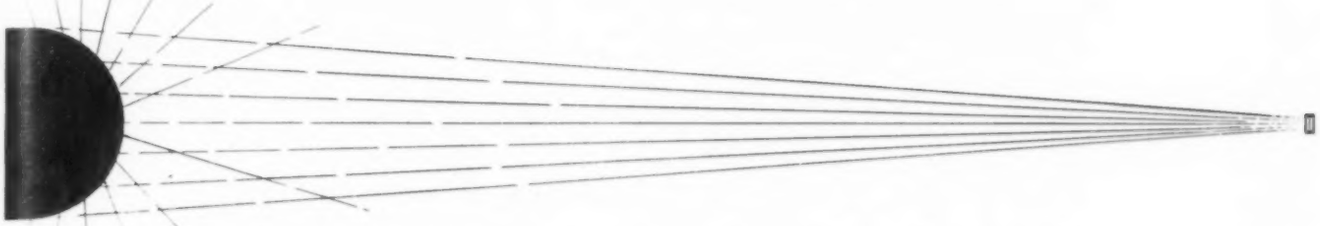
* * *

Central Pattern Co., Quincy, Ill., recently has completed and modernized a plant badly damaged by fire in the early part of the year. In addition to the pattern shop the company has built and equipped a nonferrous foundry for the production of patterns, pattern plates and sample castings. Brass, bronze and aluminum will be melted in a gas fired crucible furnace. The foundry department will be operated as the Central Brass & Aluminum Co. Originally founded in 1919, a large part of the company's activities is devoted to the design and engineering features of stoves. Herman Heidbreder is president and manager.

BLAST AND IMPACT CLEANING

Foundry operations that should . . .

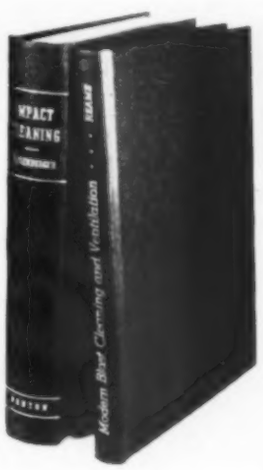
and can be profitmakers!



Too often foundry management looks on blast and impact cleaning operations as necessary evils . . . as unprofitable operations. Properly understood and applied, casting cleaning can be, and in many plants is, a step in casting manufacture that leads to increased profits. For a complete understanding of blast and impact cleaning in actual practice, the two books described below will supply practical, usable information and data. They will be particularly valuable wherever castings, forgings and billets are cleaned. These books are the most complete volumes available on the subject.

"IMPACT CLEANING", by William A. Rosenberger; 480 pages, 256 illustrations, cloth covered board binding; $7 postpaid. The author, a recognized impact-cleaning engineer, has gathered together all important information on the subject and presented it in complete and logical form. Everyone knows that cleaning costs can eat up profits. This book shows both theoretical and practical ways to reduce cleaning costs to a minimum. It presents the "why and how" of high cleaning costs and it shows exactly the methods to be used in their reduction.

"MODERN BLAST CLEANING AND VENTILATION", by C. A. Reams, engineer, Ford Motor Co., 213 pages, 38 illustrations, cloth covered board binding; $4 postpaid. Latest and most approved methods of blast cleaning and ventilation are fully covered from the standpoint of modern practice. This book is chock full of practical suggestions and examples of proven methods and practices in numerous up-to-date foundries. Application of cleaning methods as discussed in this book will help eliminate many objectionable and expensive practices and will increase the number of acceptable castings. Full information is given on selection of abrasives, abrasive cleaning methods, selection of equipment, abrasive reclamation, advantages and limitations, ventilation and reduction of industrial hazards, and scores of other helpful facts. This is a valuable text covering for the first time the entire field of blast cleaning and its allied equipment.



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☐ **"Modern Blast Cleaning and Ventilation"** @ $4 postpaid.

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*Orders for delivery in Ohio must be accompanied by 3% additional to cover compulsory state sales tax.

JOHN A. PENTON

1862-1940

(*Continued from page* 41)

Previous to 1896, local foundrymen's associations existed in New England, Philadelphia, Pittsburgh, Chicago, Texas, and a lone organization in Ottumwa, Iowa. There was little or no association between them; there was little continuity of purpose. Their efforts were largely devoted to the bringing together of foundrymen for social intercourse and better acquaintance, and in some of them an indefinite effort to exchange technical information. The guiding spirit of the Philadelphia Foundrymen's association was Howard Evans, then connected with J. W. Paxson Co.

Four years previous, in 1892, John A. Penton, seated in his bedroom and using a trunk for a table, had written and produced the first issue of THE FOUNDRY. This venture had been started against the advice of practically all of his friends, who assured him that the foundry industry was too limited in scope and interest to make it possible that such a magazine should be a successful venture. However, undaunted by the fears of his friends, Mr. Penton traveled the country, picking up news items of interest to the industry; soliciting subscriptions; and getting such support as he could from the selling of advertising, and as a by-product, building up an acquaintance with men in the industry far greater than that of any other individual.

In the meetings of the Philadelphia Foundrymen's association during 1895, the desirability of holding a national convention was repeatedly discussed; and in their frequent meetings Mr. Evans suggested the project to Mr. Penton and asked the support of THE FOUNDRY and of himself personally in putting the idea across. Mr. Penton enthusiastically volunteered his help; and the record shows abundant evidence that he caught the vision of the possibilities of a national association of foundrymen, and that this vision went much further than the ideas of most of those who were discussing the subject.

Organized Founders Association

In 1898, Mr. Penton was active in the formation of the National Founders' association, the first employers' association in the United States. He served as secretary and commissioner of that association from 1898 to 1903. Applying the experience gained through the organization of the National Founders' association, he was active in the formation of the National Metal trades association in 1899, and was elected the first secretary of that organization.

On March 1, 1901, Mr. Penton moved the publication office of THE FOUNDRY from Detroit to Cleveland, and became affiliated with the Iron Trade Review Publishing Co., publisher of the *Iron Trade Review*, to form the Iron & Steel Press Co. In 1904, Mr. Penton acquired control of the company and changed the name to the Penton Publishing Co. He served as president of the company from that date until February, 1924, when he was made chairman of the board of directors. Present publications, in addition to THE FOUNDRY, include *Steel* (formerly *Iron Trade Review*), *Daily Metal Trade*, *Machine Design*, and *New Equipment Digest*.

While busily engaged in furthering the interests of the publications of the Penton company, Mr. Penton found time to exercise his organization ability and leadership in the various industries served by those papers. He was active in the formation of the American Malleable Castings association, served as its first secretary from 1890 to 1901, and was president of the organization in 1921-22. He also played a prominent part in the organization of the Merchant Marine League in 1904. In 1914, Mr. Penton organized the American Pig Iron association, and served as its secretary and manager until 1928 when the association was disbanded.

Member of Many Associations

In addition to the activities bearing directly upon the welfare of the industries which center about the various Penton publications, Mr. Penton was a prominent figure in national affairs. He served as director of the National Industrial Conference board from 1920 to 1928. He was appointed by President Harding as a member of the National Unemployment conference held in Washington in 1921. He was a member of the American Iron & Steel institute from its inception and also was a member of the Iron & Steel Institute of Great Britain. He was an honorary member of the American Foundrymen's association.

At the Columbus convention in 1920, Mr. Penton donated $5000 to the A.F.A., as did Joseph S. Seaman, William H. McFadden and J. H. Whiting, the income to be used in making awards and giving prizes for the purpose of encouraging and stimulating meritorious effort in the industry of making metal castings. Gold medals named for the donors, are awarded by the board of awards of the association. It is interesting to note that the Penton medal represents *vision*.

In recognition of a diplomatic service during the World war, Mr. Penton was decorated by the French government in 1919 with the insignia of the Order of Reconnaissance, Francais, Premier Classe, was made a chevalier of the Legion of Honor in 1921, and an officer of the Legion of Honor in 1926.

He is survived by his widow Adah Nell Penton.

Many editorial tributes to the accomplishments of Mr. Penton have appeared in the business and metropolitan press. The following, by E. L. Shaner, appeared in *Daily Metal Trade*, Sept. 11:

* * *

In the sudden passing of John A. Penton last Sunday night at his Santa Barbara home, this publication lost its founder and its most ardent protagonist.

Thinking back over the events in more than a score of years of close association with him, this writer believes that his zeal in championing *Daily Metal Trade* was more characteristic of the real John A. Penton than many of his other qualities. It reflected the intense enthusiasm he displayed in any enterprise of his own conception and the sublime faith he manifested in its ultimate success.

If we of the present generation will try to orient this quality of overwhelming confidence in an undertaking to the conditions existing in the world of American business at the turn of the century, we will gain an understanding of the driving force, not only of Mr. Penton, but of many other dynamic business leaders of his day.

They were individualists. They had strong convictions. A thing was all right or all wrong; there was no middle ground. They worked hard, putting so much of themselves into their respective business undertakings that in that period—more than is possible today—there was much point to Emerson's statement that "an institution is the lengthened shadow of one man."

The overpowering confidence which was so characteristic of John A. Penton and his contemporaries inspired another trait that has been misunderstood in recent years. These individualists of the mauve decade were incurable optimists. They gained the major part of their experience during a period when American institutions were growing by leaps and bounds. Consequently, they, perhaps more than any other group in this nation, found it exceedingly difficult to adjust their ingrained optimistic outlook to the recurring descending curves of industrial activity during the decade of the thirties.

But of all of the contributions of these stalwart men, the most precious heritage is the confidence in one's self and in one's work.

Mr. Penton had developed it to a

(*Concluded on page* 106)

Space IS SELDOM A FACTOR WITH THE Roto-Clone!

The Type W Roto-Clone being a compact, self-contained unit, requires a minimum of floor space or may be installed entirely in overhead space as illustrated.

It has been the experience of foundries—large and small—that the Type W Roto-Clone provides *a complete solution to their dust problems*, including sand handling, conditioning, screens, mullers, tumbling mills, sand blast, shakeout and grinders.

Roto-Clone efficiency in dust separation; its constant performance under all operating conditions; its uniform air delivery, low operating cost and ease of installation—make it ideally suited to foundry service.

Write for complete engineering data and Bulletin No. 276.

AMERICAN AIR FILTER CO., INC.

Incorporated
716 Central Ave., Louisville, Ky.
In Canada: Darling Bros., Ltd., Montreal, P. Q.

TYPE W
ROTO-CLONE
For Foundry Dust Control

(*Concluded from page* 104)

marked degree in his career as a publisher of business papers. Cyrus K. Curtis and Adolph Ochs possessed it in a broader field of journalism. Charles M. Schwab and others employed it in their march to success as industrialists.

Confidence was their watchword. Would that in a world so fraught with indecision and defeatism, we could rekindle more of that spirit in the minds of men today.

* * *

The following are editorial comments from Cleveland newspapers:

John A. Penton

John A. Penton, the young iron molder who became one of the great men of Great Lakes trade, was the kind of Clevelander of whom we rarely shall see the like. Dynamic he was, and shrewd, and farsighted. But those words hide his simplicity and his amiable heartiness.

Just fifty years ago, the *Cleveland Leader* files reveal, he was in Cleveland on perhaps his first business trip. He was the iron molders' national president. A few years later, he saw the opportunity that meant fame and fortune for him. His interest in where the iron came from and where it went opened a door many such men would never have seen.

Within a short time, he had started his first industrial newspaper, dedicated, as all his periodicals were, to the industrial democracy on which this country depends.

He made his papers the authorities for the iron, steel, and shipping trades. He was more than just their publisher. He became a thinker and speaker for the heavy industries, and they will never have a more able counsellor.

He loved Cleveland, though his last years were spent in California. He believed in our potential greatness. He was one of the group which first brought Metropolitan opera here to prove it, and for years he worked on plans for an annual industrial fair in this Midwestern center, which would surpass the great fairs of Europe at which so much business, invention, and trade revival is started.

Some day Cleveland will have such an exposition, housed perhaps in its own great building. It may not come soon, but it will eventually; and when it does there ought to be a niche in it for a statue of John A. Penton.—*Cleveland News.*

* * *

Man of Industry and Culture

In the 39 years since he came to Cleveland with the first of his trade magazines, John A. Penton had become so much a part of the life of this city that his death amounts to the removal of a Cleveland landmark. His name is recorded automatically with those of the men who made this one of the important industrial centers, and who figured prominently in the growth of the nation's heavy industry in the time of its greatest expansion.

Few, if any, wielded greater influence in the business of processing metals and manufacturing metal products. Not only did his numerous publications provide a voice for the trades in whose interest they were founded, but Mr. Penton himself took an active personal part in organizing and guiding the associations through which the individual industries co-operated for the common improvement of their methods and advancement of their cause.

Mr. Penton was able to make himself the more useful in this respect because he had come up from the ranks, having met first-hand the technical problems of the metal business as a machinist and iron molder, and as one of the founders and the president of the Brotherhood of Machinery Molders.

Yet, unlike too many American business executives of the early 20th century, he balanced his knowledge of industrial problems with a keen interest in music and the other arts. He was thus able to contribute perhaps as much to Cleveland's cultural life as to its purely utilitarian interests.—*Cleveland Plain Dealer.*

* * *

John A. Penton

The industrial era that produced steel masters like Elbert H. Gary and Charles Schwab also brought forth John A. Penton, whose publications chronicling the iron and steel trade became big business in their own right.

The career of Mr. Penton is the story of a Canadian-born iron molder who turned publisher, who formed an employers' association after several years with organized labor groups, and whose publications gave industry a voice. In later years Mr. Penton was three times decorated by the French government for service in the World war.

Mr. Penton became a publisher on a big scale in the same year that the United States Steel Corp. was formed. His publications were successful from the start because the publisher knew steel from the mining of ore to the shipment of the finished product. He hired men to report and edit the news who also knew the industry.

Mr. Penton's achievements in the publishing field did not prevent his giving freely of his time and energy to civic enterprises. He was a patron of music and as a hobby was a collector of antiques. His love for blooded horses led to the building of a half-mile race track on the country estate which he had one time maintained in Cuyahoga county.

Since 1924 Mr. Penton has lived in California but he wasn't the type of man to retire. His death is a blow to a great number of friends and a blow also to the community in general.—*Cleveland Press.*

Papers on Training Programs Printed

American Foundrymen's association, 222 West Adams street, Chicago, recently has published reprint No. 40-29 of the management series, giving the proceedings of the sessions on foreman and apprentice training in foundries at the forty-fourth annual convention sessions in Chicago. The 68-page booklet contains a panel discussion on foreman training, and the following papers: "An Adaptable Apprentice Program," by A. L. Armantrout, Carnegie-Illinois Steel Corp., Chicago; "Technique of Training Foundry Apprentices," by A. H. Wornom, Newport News Shipbuilding & Drydock Co., Newport News, Va.; "A Graduate Apprentice's View of his Training," by C. W. Wade, Caterpillar Tractor Co., East Peoria, Ill.

Designing of Steel Castings Filmed

Steel Founders Society of Amera, for many years has served as a clearing house for information and ideas on the designing of steel castings. Because requests for detailed information on the subject continues to grow, the society has prepared a sound film to explain all the known and tested principles of steel casting design. The film runs a half hour and is entertaining as well as educational.

Various principles of design are brought out simply and clearly. The highly technical subject is treated in an informal and interesting manner, making it easily understood even by those without a technical training.

The new film is available for showing before local chapters of engineering societies, and sound and projection equipment also can be supplied without charge. Requests for bookings should be addressed to the Steel Founders Society of America, 920 Midland Building, Cleveland, or on the West coast, to George L. Kennard, Northern California Foundrymen's institute, 304 Rialto building, San Francisco, Calif.

VALVE LIFTERS MOLDED IN GREEN SAND

(*Continued from page* 45)

sult was that the chill block would absorb heat so rapidly that by the time the mold cavity was filled, the top of the chill-block became too warm to act as a good chill.

Result of heat absorption was an angling chill beginning with a deep chill at the bottom and fading out at the top. Past experience on mushroom-type tappet-head castings had demonstrated the advantage of a single metal chill plate covering the entire bottom of the mold so that all castings were poured on the same plate. It was also necessary that the pouring be in a vertical plane so that the metal exerted a constant downward ferrostatic pressure. The problem resolved itself around developing a method of applying the same principles of making mushroom-type tappet-head castings to the barrel type valve lifter casting.

Made in Three Part Mold

The all-green sand method of molding was the complete solution to the problem. By that design and method, castings are molded and poured in a vertical plane on a single metal chill plate for the entire mold as shown in Figs. 14 and 15. The dry sand center core was eliminated completely by having the outside and inside of the casting formed by green sand. Gates of castings are shown in Figs. 4, 6 and 11. The method utilizes a three-part mold—a cope, cheek and drag. However, for descriptive purposes, we will refer to the top as the cope and the cheek as the drag, since the drag metal chill plate practically acts as a conventional bottom board.

On some particular castings with a double window opening separated by a center web, a four-part mold is used, namely, a cope, an upper cheek, a lower cheek, and a metal chill plate, which acts as the drag. The sequence of operations to be described is for a three-part mold as the four-part mold is exactly the same, with the exception of the additional upper cheek mold. The cope patterns, Fig. 18, form that part of the casting above the ported window openings and are mounted on a conventional cope pattern plate. The cope also contains the downsprue, the runner and the gates.

Drag patterns, Fig. 19 are mounted on stools with a conventional stripping plate, and the drag patterns form that part of the casting from the bottom of the platform section to the top of the ported window opening, both inside and outside diameters. Green sand forming the inside of the casting is held in suspension through the ported window openings. Squeezer head patterns, Fig. 20, are recessed into the squeeze plate. The latter forms the parting line on the top of the drag mold and on certain types of valve lifters also forms that section of the mold which protrudes above the parting line.

A sequence of operations to make a complete mold is as follows: The drag mold is made on a jolt-squeeze-strip molding machine, utilizing a double squeeze plate. A filler frame is placed on top of the drag flask which then is filled with sand to the top of the filler frame and struck off. The filler frame is removed and the first squeezer plate compresses the sand between the patterns and forms. For certain types of castings, a conical or beehive shape of sand above each pattern is acted upon by a second squeezer operation to form that section of the mold which protrudes above the parting line. That subsequent or second squeeze operation presses down the drag mold to the exact parting line and shapes the beehive section of sand above the parting line to the desired form.

Sidewall prongs of the drag patterns, during both squeeze operations, telescope through the openings

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in the squeezer head. The squeezer plate lifts off, and the drag patterns drop through, the stripping plate and the drag mold is formed to an exact thickness with the mold cavity through its entire length. The green sand for the inside diameter is held in suspension through the ported window openings. Cope mold is made by conventional methods on a jolt-squeeze molding machine and contains pouring sprue, runner and gates.

The drag mold is placed upon the metal chill plate, which is maintained at the correct temperature for each particular type of valve lifter casting. The mold then is closed with the cope and ready for pouring. Those movements complete the entire cycle of operations necessary to make a finished mold.

Working face of the metal chill plate is grooved to provide a serrated face on the castings as shown in Fig. 5. The grooves perform two distinct functions: (1) They check instantly any tendency on the part of the hot metal to swirl or rotate so as to cause eddies or creases in the chilled face and (2) the grooves, where they project beyond the edge of the casting, are closed by the sand of which the mold is made, and the sand forms a filter-like gas vent through which the gases seep along the grooves and have their pressure relieved.

Under the former conventional method of molding, equipment consisted of 20 patterns per mold and it was necessary to set 20 metal chill blocks and 20 dry sand cores. It required 8.73 man-hours to produce 51 molds and cores per hour, for a total of 1020 castings per hour. Under the new all-green sand method, equipment consists of 32 patterns per mold and 2.68 man-hours produce 55 molds per hour for a total of 1760 castings per hour. That results in 69 per cent less man-hours per equipment per hour, with a gain of 73 per cent more castings produced per hour from each equipment. On one type of representative castings under the conventional method, the yield per mold was 57 per cent. The same type casting under the new method has a yield of 67 per cent or a gain of 18 per cent in yield.

The figures graphically show the superiority of the new method over the old in concrete terms of lower cost and production efficiency. To those advantages also must be added the abstract gains obtained in the quality of the castings due to uniform sidewalls, close weight tolerance, superior wearing chill faces, more uniform chill depth and dimensional accuracy.

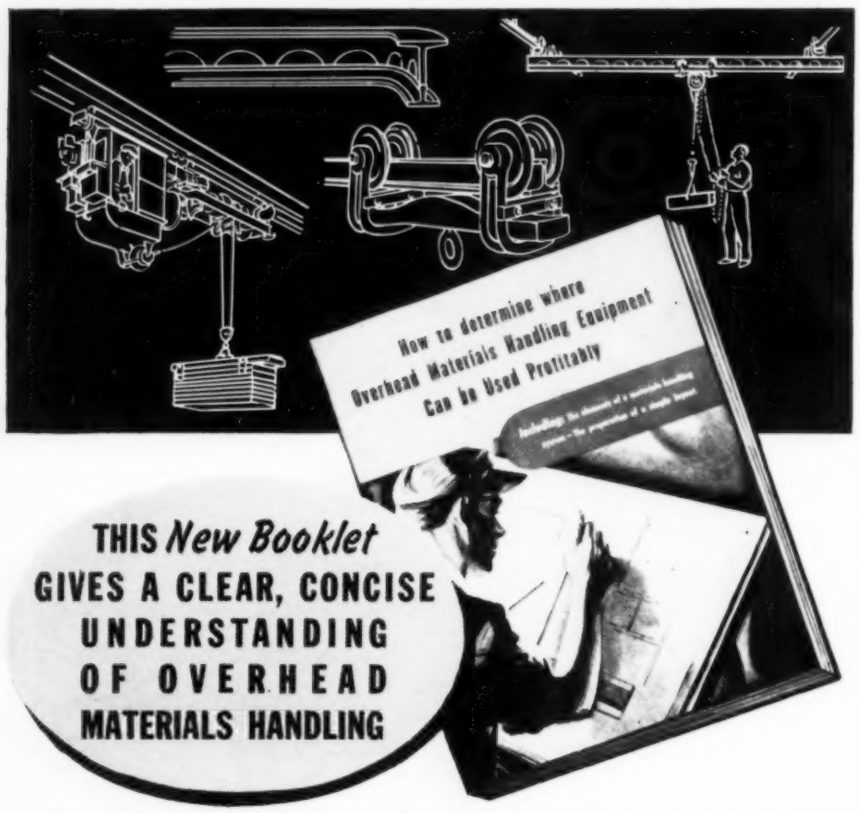
A combination of all those qualities with lower foundry scrap loss during machining operations gives much higher machine efficiency and lower machining costs in processing the castings through the machine shop from the rough casting to the completely finished part.

Pattern Cost Is High

Construction of the pattern equipment for the barrel-type valve lifter castings presented an unusual problem. As the development of the method of all green sand molding progressed through the experimental stage, speed of production and inherent economical advantages became apparent, but seemed to be offset to a considerable extent by costly initial pattern expense and pattern maintenance.

Each equipment consists of 32 patterns complete with stripping plate and stools, and each drag pattern would have 4 sidewall prongs which would telescope during the squeezing operations through as many corresponding openings in the squeezer head. To produce patterns by the conventional method to the accuracy required was prohibitive from a cost standpoint, even for the initial equipment without consideration to the constant expense of duplication for maintenance. Jolt-squeeze-strip molding operation would be destructive to that type of patterns, due to its fragile walls and intricate design.

Replacement of patterns by selec-



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tive fit would be difficult from a maintenance standpoint, especially during production operation as the slightest misalignment between the sidewalls prongs on the drag pattern and the corresponding openings in the squeezer head would cause binding when the squeeze pressure was applied. That could break the patterns and cause a hold-up in production. Experimental work demonstrated that the openings through the squeeze head should have a minimum clearance for free movement of the telescopic action of the prongs on the drag patterns and yet be to a sufficiently close tolerance so as not to allow molding sand to come between the prongs and the squeezer head openings, as that would result in abrasive action and cause excessive wear. Experience showed that about 0.003-inch clearance was the allowable variation permissible on this type of pattern equipment.

Economic accomplishment required that all drag patterns and squeezer heads be absolutely interchangeable, since adjusting and repairing patterns to the close tolerances required would be impractical. When a molding unit is in full production, it usually is operated 16 hours per day, which meant short equipment life and frequent replacement of patterns. High daily production required also made quick replacement of a few patterns desirable, should they by some reason or other be broken during operation. The patterns would have to be replaced quickly and regular production resumed with the least possible delay.

Use Die Cast Patterns

Complete solution of the pattern equipment problem was found by using die cast patterns of a regular commercial zinc-base white metal as shown in Fig. 8. Extensive tests were made of that material and it was found that it had the necessary strength and wearing qualities comparable to regular metal patterns. Subsequent experience has shown that die-cast patterns have certain inherent advantages over conventional machine made or hand made patterns, some of which are uniformity, dimensional accuracy and a smooth working surface that eliminates the wearing-in period. Both the drag pattern and squeezer head patterns are cast in one die-mold of a single cavity each which assures absolute interchangeability and uniformity of dimensions within 0.003-inch tolerance.

Accurate locating of drag patterns in the stools and the squeezer head patterns in the squeeze plate is essential, and is accomplished with a mortise and tenon and by having the patterns recessed into the plates, and anchored with locking screws. To change a pattern during production operation, it is only necessary to remove the screws, lift out the worn or broken patterns and replace with new ones, which drop exactly into position with no necessity for alignment. A single pattern can be replaced in approximately five minutes.

Silicosis Report

The following interesting statement is made in the annual report of the Wisconsin Industrial commission for 1939: The great influx of claims based on silicosis, which reached its height in the years 1933 and 1934, has now been reduced to a point where no special handling is required. At one time several hundred of these cases awaited determination. At the present time, cases have all been decided, with the exception of the small current flow, which amounts to about five cases per month. It is gratifying to know that Wisconsin industries have discharged their current obligation to silicotics and that future burden of these cases will not be an excessive one, nor will it need an essentially different treatment than that given to accident cases.

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DEVELOPMENTS IN CASTINGS

(*Continued from page 48*)

analysis throughout this article departs from prevalent ideas of 20 years ago when iron castings were made from mixtures. These mixtures included a variety of raw materials. To diagnose conditions, foundrymen of today cannot do without chemical analyses, although some of the older operators still feel it is unnecessary.

A ladle addition of any deoxidizing agent to hot, low-carbon, low-silicon iron, such as an addition of aluminum, barium, calcium, carbon, chromium, magnesium, manganese, silicon, titanium, vanadium, or zirconium, usually will diminish wall sensitivity. This modification is accompanied simultaneously by a reduction in the chilling tendencies of the iron as determined by a wedge test.

Fig. 1, for example, illustrates the control of total carbon and silicon through the use of briquetted alloys as a partial source of silicon. Some charges oxidize more readily than others; and Fig. 2, at 100 X, and Fig. 3, at 500 X, show the structure of iron castings made from a very poor (highly oxidized) charge of miscellaneous scrap, plus seven silicon and two manganese briquets per 1000-pound charge. This iron analyzed 3.34 per cent total carbon, 0.81 per cent combined carbon, 2.28 per cent silicon, 0.54 per cent manganese, 0.57 per cent phosphorus, 0.14 per cent sulphur. While some steadite and inclusions are evident, the iron was quite good in view of the exceptionally poor charge.

By the use of a selected charge of steel, cast iron and briquetted alloys, a fair degree of strength and ductility may be obtained in cast iron, as shown in Fig. 4 taken at 500 X. This iron tested 41,950 pounds per square inch tensile strength, 217 brinell hardness, 0.31-inch deflection, and analyzed 1.44 per cent silicon, 3.41 per cent total carbon, 0.82 per cent combined carbon, 1.47 per cent manganese, 0.14 per cent sulphur and 0.04 per cent phosphorus.

Reducing the depth of chill and softening light sections may be accomplished by the use of a special graphitizer composed essentially of ferrosilicon and graphite. An addition of a fraction of a per cent of special graphitizer to certain cast irons has not only improved machinability and fluidity, but it has tended to eliminate eutectic ferrite-graphite areas, and to improve uniformity and strength.

Add Special Graphitizer

Fig. 5 shows the influence of an addition of 4 ounces of special graphitizer per 100 pounds of iron to a gray iron analyzing 3.20 per cent total carbon, 0.60 per cent combined carbon, 2.26 per cent silicon, and having a brinell hardness of 202. The treated iron analyzes 3.23 per cent total carbon, 0.55 per cent combined carbon, 2.29 per cent silicon and has a brinell hardness of 192. There is no coarsening of the structure in the gray section of the illustration.

It may be of interest to report that with a base iron analyzing 3.40 per cent total carbon, 2.50 per cent silicon, the softest metal that could be produced in the as-cast condition was 147 Brinell. The treatment consisted of an addition of special graphitizer and 85 per cent ferrosilicon. The handbooks describe cast iron with brinell hardnesses varying from 130 to over 700, but it is quite difficult actually to produce a casting with a brinell hardness of only 130.

Fig. 6 shows the influence of the special graphitizer on the grain size as brought out by etching a graphitized iron containing 0.86 per cent

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- a 175 KW, 500 lb. furnace for melting straight nickel and high nickel alloys for electrical castings.
- a 125 KW, 350 lb. furnace for melting brass and bronze alloys in the manufacture of valves and steam specialty castings.

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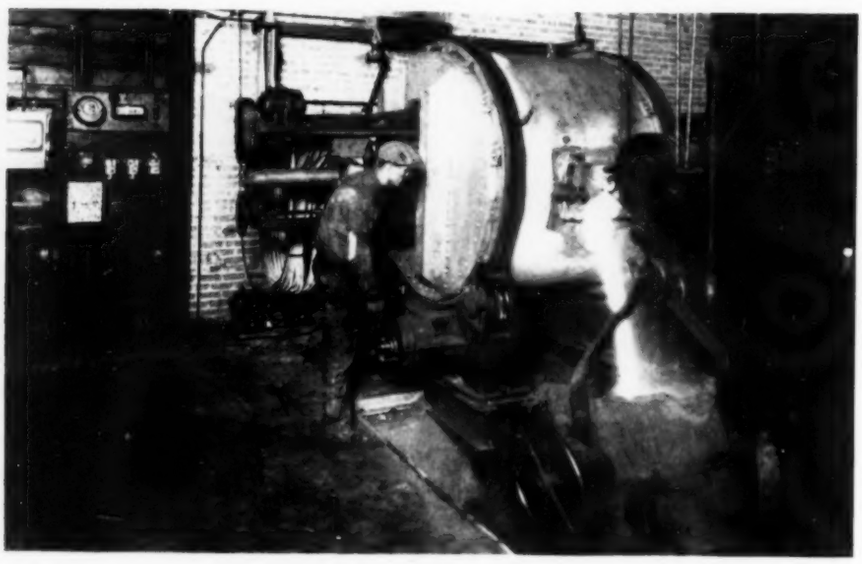

DETROIT ELECTRIC FURNACE DIVISION

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of combined carbon. The specimens illustrated are similar in composition except that the addition of special graphitizer was made only to the one on the right.

Eutectic ferrite-graphite is often found in an intermediate section or just beneath the surface of a fairly heavy casting. That structure may be detected readily when the casting is being machined, since eutectic ferrite-graphite is usually softer than the surrounding metal. That structure often is responsible for poor wear resistance, and has also been found responsible for blistering of enamel on some enameled irons. Iron in which eutectic ferrite-graphite is present chills more readily, is highly sensitive to any variation in section thickness, and is subject to galling on metal to metal surfaces.

Fig. 7 shows a hard low-silicon, low-carbon cast iron containing 2.95 per cent of total carbon, 0.71 per cent of combined carbon and 1.58 per cent of silicon. Attention should be called to the presence of eutectic ferrite-graphite. This constituent is not necessarily found throughout the casting, but is peculiar to certain sections of some castings.

Constituent Is Absent

Fig. 8 shows the complete absence of this eutectic ferrite-graphite constituent when the same iron as that exhibited in the previous illustration is treated with special graphitizer. Incidentally, the tensile strength was increased from 32,000 to 38,000 pounds per square inch.

Fig. 9 shows the presence of this same eutectic ferrite-graphite constituent at 250 X. It is in a soft iron in the zone adjacent to chill. The groundmass is martensitic, and the iron contains 3.48 per cent of total carbon, and 2.90 per cent of silicon.

Fig. 10 shows the same base iron, treated with special graphitizer. This section, also, is adjacent to a chilled surface. It demonstrates the ability of the graphitizer to prevent the formation of eutectic ferrite-graphite structure.

Another method of preventing eutectic ferrite-graphite formation is to use an alloy containing chromium, manganese, silicon, and zirconium. A ferroalloy has been tried experimentally which contained roughly 20 per cent of chromium, 10 per cent of manganese, 20 per cent of silicon, and 5 per cent of zirconium. Experimental work now in progress indicates that a modified analysis will be even more effective. Fig. 11 shows a typical so-called *hard* cylinder iron made without the use of this alloy by one of the motor companies. The casting analyzes 3.11 per cent total carbon, 0.59 per cent combined carbon, 2.18 per cent silicon, 0.76 per cent manganese, 0.11 per cent phosphorus and 0.08 per cent sulphur.

Fig. 12 shows the same iron treated with 1 per cent of the chromium-manganese-silicon - zirconium alloy. A diminished amount of eutectic ferrite-graphite with corresponding loss in the tendency to chill is observable, and the effect of the alloy may be considered softening when added to this so-called hard iron. When the same amount was added to the so-called *soft* cylinder iron with 3.42 per cent of total carbon, 2.64 per cent of silicon, 0.82 per cent of manganese, the chill was increased as shown in Fig. 13.

In both cases the alloy exerts a deoxidizing effect first; and, since there probably was more dissolved oxygen in the lower total-carbon iron than there was in the high total-carbon iron, the iron is softened by an addition of a deoxidizing agent. In the case of the softer iron with higher total carbon and higher silicon, the alloy is not consumed in counteracting the effect of oxygen, so that the chromium and manganese increase the chilling tendencies by their alloying effect.

Further means similar to that just mentioned are available for eliminating wall sensitivity, eutectic ferrite-graphite constituents and tendency to chill. Fig. 14 shows an iron with 3.43 per cent of total carbon, 0.36

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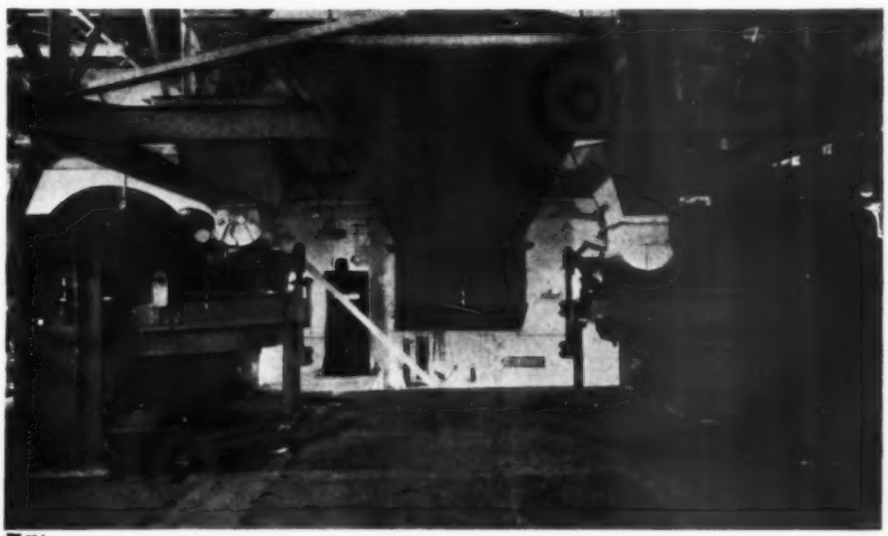

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per cent of combined carbon, 2.57 per cent of silicon, 0.59 per cent of manganese, 0.04 per cent of chromium. Tensile strength was 26,800 pounds per square inch. An addition of 0.50 per cent of chromium to this iron increases the combined carbon from 0.36 per cent to 0.66 per cent, and the iron shown in Fig. 15 shows the absence of any eutectic ferrite-graphite constituent. Tensile strength is 33,800 pounds per square inch, an increase of roughly 7000 pounds per square inch. Fig. 16 shows the same iron treated with 0.75 per cent of chromium. The combined carbon was increased to 0.70 per cent, and the tensile strength to 35,575 pounds per square inch.

Fig. 17 is again the same iron with an addition of 1.25 per cent of chromium. Here the combined carbon was increased to 0.93 per cent, and chromium carbides are now visible in the etched sections. The tensile strength is 36,000 pounds per square inch, the iron is approaching the point where machinability would diminish but it is also approaching the point where resistance to growth at 1200 or 1300 degrees Fahr. is obtained. In all of these tests the chromium was added to 50-pound capacity ladles of iron. The medium-carbon grade with 1.75 per cent of silicon was used since this alloy would change the total carbon the least of any of the grades of ferrochrome.

This is the first of two articles from a paper presented at a meeting of the Pittsburgh Foundrymen's association. The second will appear in an early issue.

Core Behavior at High Temperatures

(*Continued from page* 52)

evaluating a core at room temperature is by the hardness, which may be determined by a finger nail scratch test or by a core hardness tester. Having these two methods of gaging the desirability of a core, it would be advantageous to know how tensile strength and core hardness may be used to control the expansion of a core at elevated temperatures.

Expansion of a core may be measured easily with the aid of the dilatometer furnace, shown in Fig. 1. The core is placed on a pedestal and the furnace, at the pouring temperature of metal, is lowered around the core specimen. Expansion of the core is shown by a dial indicator located on top of the unit.

The core specimens, as used in the tests under discussion, were baked at 400 degrees Fahr. and prepared from a mixture of the following: Michigan City lake sand, A.F.A. fineness 55; 1.3 per cent cereal binder; linseed oil base core compound; ratio of mixture of oil to sand, varied from 1:50 to 1:100 by volume.

Control Core Expansion

Relation of tensile strength to expansion is well illustrated in Fig. 2. As the tensile strength of a core decreases, expansion decreases rapidly. For example, when the tensile strength is 190 pounds per square inch, with the mixture under consideration the expansion is equal to 0.091 inches per inch of core length. Should the strength be decreased to 130 pounds per square inch, the expansion is reduced to a very low figure of 0.004 inches.

When using core hardness as the index, a core hardness of 75 corresponds to an expansion of 0.091 inches. Reducing core hardness to 59 lowers the expansion to 0.004 inches. To secure this range of strength and core hardness, the oil to sand ratio, see Fig. 2, was changed from 1:50 to 1:100.

Thus one way the expansion of a core may be controlled readily is through control of the tensile strength or core hardness. Many defects such as *cat whiskers, fins*

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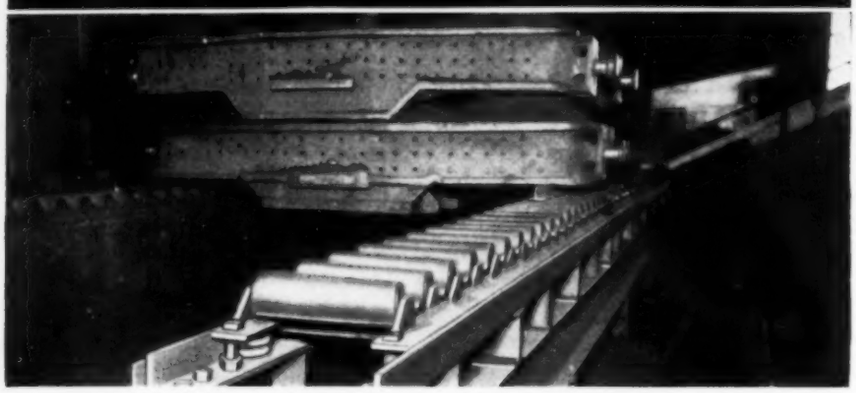

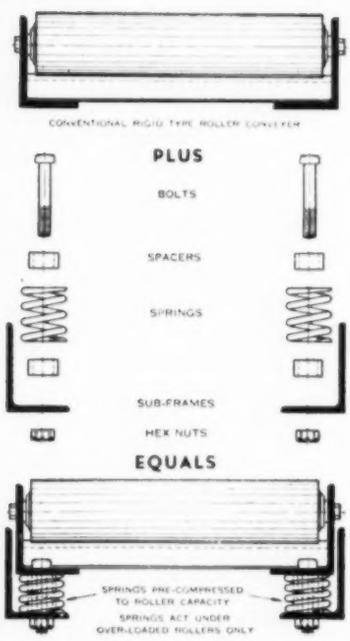

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CONTINUOUS FLOW PRINCIPLE OF HANDLING MATERIALS

and *hot cracks* may be held in check by maintaining a definite control over core tensile strength or core hardness. These two properties are held to a minimum reducing the expansion to safe limits.

Rate at which a core collapses should be controlled to obtain the best casting result. When the core collapses too fast, defects such as dirt, and *core washes* show up. Should the core collapse too slowly then *hot cracks* and difficult shakeout are experienced. Time required for a core to collapse may be measured easily with the furnace shown in Fig. 1. A load of 4 ounces per square inch is applied to the core. The furnace at 2500 degrees Fahr. is pulled over the core. Time in minutes required to collapse the core specimen fully or cause a contraction of 0.070 inches is recorded as collapsing time. Collapsing time of various baked cores is shown in Fig. 2.

It may be noted that strong cores with a tensile strength of 190 pounds per square inch, which corresponds to a core hardness of 75 for the mixture under discussion, in the present instance collapse slowly; requiring 6.3 minutes. A core with a moderate strength of 130 pounds per square inch possessing a medium hardness of 59, collapses fairly rapidly in 4.1 minutes. One method of controlling the rate at which a core collapses is to control the strength and hardness.

Show Rate of Collapse

Rate at which a core collapses, as it is heated by molten metal, may be varied, not only by the strength of the core but also by the core permeability and clay content of the mixture. As an example of how the collapsibility of a core may be varied a group of four cores with physical properties as shown in Table I, is of interest.

Rate at which these cores collapsed is shown graphically in Fig. 3. Core No. 4 which did not contain any clay bond required 2.5 minutes to collapse. Core No. 2 with 1.75 per cent bentonite required 4.8 minutes to collapse. Core No. 1 contained knock-out sand which carried considerable clay substance and required 8 minutes to collapse. This illustrates how the collapsibility of a core may be retarded by increasing the clay substance in the core mixture.

Comparing the core permeabilities of the four cores under discussion, it may be noted that core No. 4, with 250 permeability, collapses fast in 2.5 minutes, while core No. 1, with a permeability of 109, collapses slowly in 8 minutes. Thus, as the core sand becomes finer the core will collapse more slowly and will require more effort to shake out.

Book Review

An Outline of Metallurgical Practice, by Karle R. Hayward, cloth, 690 pages, 6 x 9 inches, published by D. Van Nostrand Co. Inc., 250 Fourth avenue, New York, $7.50.

This volume, which is the second edition of a book first published in 1929, has been revised to a considerable extent to include such new processes, and improvement of older processes which have developed during the intervening period. As the title of the book indicates, it is a general treatise designed as a quick reference book for engineers, and for students studying metallurgy. It is divided into 25 chapters which discuss practically all metals.

Information is given on winning the metal from the ore, physical and mechanical properties, alloying properties and chemical behavior. Metals discussed include copper, lead, zinc, aluminum, nickel, tin, mercury, antimony, arsenic, bismuth, cadmium, cobalt, magnesium, beryllium, gold, silver, platinum, chromium, tungsten, manganese, vanadium, molybdenum, zirconium, ferrous, and nonferrous alloys.

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PROBLEMS IN NONFERROUS PRACTICE

(*Continued from page* 49)

tion to the temperature and to the length of time the metal remains in the combustion zone. These gases are liberated within the casting in inverse proportion to its solidification rate. Although foundrymen know that a slightly oxidizing atmosphere is desirable, nearly all brass and bronze alloys are melted under reducing conditions. A reducing flame promotes faster melting. On any oil or gas fired furnace it is easy to determine whether an oxidizing or reducing flame exists. Pass a cold piece of zinc through the flame. If it comes out black the furnace is highly reducing, straw yellow, slightly reducing. If it comes out clear and fresh, the furnace is oxidizing. With a few minutes of this practice the furnace atmosphere can be regulated to perfection.

To obtain maximum properties of the alloy and sound castings where virgin metals are melted the copper is heated to a plastic condition, then the zinc, lead and tin are added in that order. Where virgin copper and tin are to be alloyed the copper is melted first. Then 2 ounces of 15 per cent phosphor copper is added 5 minutes before the tin is introduced. Addition of phosphor copper prevents the formation of tin oxides. Virgin copper and nickel are melted together. The nickel will go into solution by association without coming up to anywhere near its melting point.

In operating a coke fired furnace the empty crucible should be raised to a red heat. The bottom is covered with coarse charcoal. Ingot or heavy scrap is charged and the crucible is kept full but the metal never is allowed to get above the plastic stage until the entire charge is in the pot. The metal then is superheated for pouring. The metal should not be raised more than 100 degrees Fahr. above the anticipated casting temperature. Metal should not be held in the furnace after it reaches the desired temperature.

Charge Is Superheated

In an oil fired furnace the crucible also is raised to a red heat before it is charged. Half pound of broken glass per 100 pounds of metal is placed on the bottom. The total charge is weighed and as much as possible is placed in the crucible. The remainder is placed on top of the furnace and preheated. Later as the metal in the pot settles down, the metal on top of the furnace is pushed in as fast as the crucible is in condition to receive it. As in the former instance the metal should not be allowed to pass the plastic stage until the crucible is filled. Then the entire charge is superheated for pouring. After the pot is pulled from the fire the glass is skimmed from the top before the phosphor copper is added. The alloy should not be heated more than 100 degrees above the proposed pouring temperature and it should not be allowed to soak or remain in the furnace after the proper temperature has been reached. Metal should not be raised to a high temperature and then cooled down. Some of the absorbed gas is trapped and will be liberated in the casting. No glass or phosphorus is used in alloys containing aluminum.

Lining in the electric furnace should be raised to a red heat before the charge of metal is introduced. As with other types of furnace the metal should not be superheated to more than 100 degrees above casting temperature and the metal should not be allowed to soak in the furnace. The tap hole should be maintained at the proper size to prevent the electrodes from charg-

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ing the bath with carbon monoxide gas. Metal should be removed from the furnace immediately after the proper temperature is reached.

In open flame furnaces where the products of combustion come into direct contact with the metal, the lining is first raised to a red heat and then ½-pound of glass is placed on the bottom for every 100 pounds of metal. If possible the entire charge should be placed in the furnace and melted as a unit. Other precautions, keeping the metal at a plastic stage while additions are made superheating, etc. are the same as described with other melting units.

Finally, if the sprue is not kept full during the pouring operation, all the effect of good gating, molding and melting is lost. It is easier to pour into an oblong basin than a round one. If the metal strikes the side it will not throw out on the mold. Whiskers or strings dangling from the lip of the crucible indicate that the metal is not sharp enough. Addition of a little phosphor copper will prevent the formation of these dangling menaces and their subsequent entrance into the mold. Anv alloy containing aluminum will show films. In these cases the phosphor copper addition is not recommended.

Metal Is Not Responsible

Common defects often blamed on metal instead of other responsible factors include: 1—Porous spots in the casting due to improper feeding. 2—Gassed castings from over heating or soaking metal in the furnace. 3—Leaky castings caused by oxide films where the pouring temperature is too low. 4—Water vapor holes driven into the casting inversely by metal penetrating the sand. 5—Gas holes driven into the casting by metal penetration of the core. 6—Slag and dross holes formed by the metal boiling in the sprue and runner. 7—Slag formed while pouring metal containing dissolved lining of the ladle. 8—Slag coming in unnoticed from an old slag line under the present metal level in the ladle. 9—Water vapor holes caused by steam generated from paste or mud in the core joints. 10—Water vapor holes from metal boiling in a low permeable sand. 11—Blow holes from low permeable mold or core.

Analysis, physical properties and other pertinent data on one aluminum and 11 typical brass and bronze metals are set forth in the following presentation arranged alphabetically for easy reference.

Aluminum alloy No. 12 used in a wide variety of castings molded in sand. Aluminum 90.5 per cent, copper 7 per cent, iron 1 per cent, zinc 1½ per cent. Pouring temperature light 1500, medium 1300, heavy 1250 degrees Fahr. Flux 1 ounce zinc chloride per 100 pounds metal. Tensile strength 21,000, yield point 12,000 pounds per square inch; elongation 1 and reduction of area 0.00 per cent; brinell 65; shrinkage 5/32-inch per foot. Sand permeability 6, strength 7 pounds, grain 225, clay content 25 per cent, moisture 7 per cent.

Aluminum bronze contains copper 83 per cent, iron 4 per cent, aluminum 13 per cent. Pouring temperature light 2250, medium 2150, heavy 2050 degrees Fahr. No flux or deoxidizer. Tensile strength 85,000, yield point 35,000 pounds per square inch; elongation 4 and reduction of area 2 per cent; brinell 230; shrinkage 5/16-inch per foot. Sand permeability 25, strength 7 pounds, grain 100, clay content 10 per cent, moisture 6 per cent.

Bearing bronze for moderate loads and speeds. Copper 80 per cent, tin 10 per cent, lead 10 per cent. Pouring temperature light 2100, medium 2000, heavy 1900 degrees Fahr. Deoxidizer 4 ounces 15-per cent phosphor copper per 100 pounds metal. Tensile strength 35,000, yield point 10,000 pounds per square inch, elongation 8 and reduction of area

Here's How Cleaning, Shipping and Molding Bays were co-ordinated for NICHOL STRAIGHT FOUNDRY CHICAGO, ILL.

This installation solved a problem common in many foundries today where heavy crane equipment serving the molding floor is interrupted in use to transfer castings from molding floor to trucks, etc. for removal to the cleaning room. As designed, the above system cantilevers into the molding bag, speeds up handling, serves from molding floor, to cleaning, to shipping—will return its reasonable cost in time and effort saved. Bulletin PCR-100-D shows 16 pages of typical CHICAGO TRAMRAIL installations. May we send you a copy?

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8 per cent, brinell 50, shrinkage 3/16-inch per foot. Sand permeability 25, strength 7 pounds, grain 100, clay content 10 per cent, moisture 6 per cent.

Bearing bronze for light loads at high speed. Copper 71 per cent, tin 6 per cent, lead 22 per cent. Pouring temperature light 2100, medium 2000, heavy 1900 degrees Fahr. Deoxidizer 4 ounces 15-per cent phosphor copper per 100 pounds metal. Tensile strength 22,000, yield point 12,000 pounds per square inch, elongation 10 and reduction of area 7 per cent, brinell 45, shrinkage 3/16-inch per foot. Sand permeability 25, strength 7 pounds, grain 100, clay content 10 per cent, moisture 6 per cent.

Faucet brass for faucets, shut-off valves and other castings where a lower cost red brass will serve. Copper 79 per cent, tin 2 per cent, lead 7 per cent, zinc 12 per cent. Pouring temperature light 2300, medium 2200, heavy 2100 degrees Fahr. Deoxidizer 1 ounce 15-per cent phosphor copper per 100 pounds metal. Tensile strength 26,000 and yield point 12,000 pounds per square inch, elongation 22, reduction in area 25 per cent, brinell 50, shrinkage 3/16-inch per foot. Sand permeability 20, strength 7 pounds, grain 150, clay content 15 per cent, moisture a maximum of 7 per cent.

Gear bronze, acid resisting for paper mills, etc. Copper 89 per cent, tin 11 per cent. Pouring temperature light 2150, medium 2050, heavy 1950 degrees Fahr. Deoxidizer, 1 ounces 15-per cent phosphor copper per 100 pounds metal. Tensile strength 40,000, yield point 20,000 pounds per square inch, elongation 15 and reduction in area 12 per cent, brinell 80, shrinkage 3/16-inch per foot. Sand permeability 25, strength 7 pounds, grain 100, clay content 10 per cent, moisture 5.5 per cent.

Gun bronze for strength and quality where a tough and strong bronze is needed. Copper 88 per cent, tin 10 per cent, zinc 2 per cent. Pouring temperature light 2150, medium 2050, heavy 1950 degrees Fahr. Deoxidizer 2 ounces 15-per cent phosphor copper per 100 pounds of metal. Tensile strength 40,000, yield point 20,000 pounds per square inch, elongation 20 and reduction in area 20 per cent, brinell 70, shrinkage 3/16-inch per foot. Sand permeability 25, strength 7 pounds, grain 100, clay content 10 per cent, moisture 5.5 per cent.

Manganese bronze, a strong, tough metal to resist sea water corrosion. Copper 57 per cent, aluminum 1 per cent, manganese 0.5 per cent, iron 1 per cent, zinc 40.5 per cent. Pouring temperature light 2000, medium 1950, heavy 1850 degrees Fahr. No deoxidizer or flux. Tensile strength 70,000 and yield point 30,000 pounds per square inch, elongation 30 and reduction in area 35 per cent, brinell 126, shrinkage ¼-inch per foot. Sand permeability 25, strength 7 pounds, grain 100, clay content 10 per cent, moisture 6 per cent.

Secure White Color

Nickel silver where a white color is desired without plating. Copper 65 per cent, nickel 20 per cent, tin 4 per cent, lead 5 per cent, zinc 6 per cent. Pouring temperature light 2500, medium 2400, heavy 2300 degrees Fahr. Degassifier, 1 ounce manganese per 100 pounds 5 minutes before removal from furnace, 3 ounces 15-per cent phosphor copper shot before pouring. Tensile strength 45,000, yield point 22,000 pounds per square inch, elongation 18 and reduction in area 15 per cent, brinell 55, shrinkage 3/16-inch per foot. Sand permeability 60, strength 5 pounds, grain 85, clay content 15 per cent, moisture 5 per cent.

Red brass for valves, fittings and a wide range of castings requiring a red metal. Usually referred to under the title 85, three 5's. Copper 85 per cent, tin 5 per cent, lead 5 per cent, zinc 5 per cent. Pouring temperature light 2250, medium 2150, heavy 2050 degrees Fahr. Deoxidizer 1½ ounces 15-per cent phosphor copper per 100 pounds metal. Tensile strength 30,000, yield point

PROOF that Maehler Airheat Ovens and Conversion equipment deliver the goods in lower costs and better cores can be found in the growing list of customers who have come back for more! Here are a few recent repeat orders:

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And these concerns have just joined the ranks of satisfied Maehler customers:

Blackmer Pump Co., Grand Rapids, install new airheat oven. In first month reduced small core baking time 65%; large core bake time 30% under previous methods • Atlas Foundry Co., Detroit, special metal job foundry • Detroit Brass & Malleable Works, Detroit, pipe fittings foundry • Herron Stove & Manufacturing Dept. of American Brake Shoe & Foundry Co. Day Oven.

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15,000 pounds per square inch, elongation 20 and reduction in area 20 per cent, brinell 55, shrinkage 3/16-inch per foot. Sand permeability 20, strength 7 pounds, grain 150, clay content 15 per cent, moisture 7 per cent.

Steam bronze is a high grade material used for steam valves, high pressures and wherever a high quality metal is required. Copper 87 per cent, tin 6 per cent, lead 2 per cent, zinc 5 per cent. Pouring temperature light 2200, medium 2100, heavy 2000 degrees Fahr. Deoxidizer 1½ ounces 15-per cent phosphor copper per 100 pounds metal. Tensile strength 40,000, yield point 18,000 pounds per square inch, elongation 28 and reduction in area 24 per cent, brinell 55, shrinkage 3/16-inch per foot. Sand permeability 20, strength 7 pounds, grain 150, clay content 15 per cent, moisture 6 per cent.

Yellow brass used wherever a cheap metal with a yellow color will serve. Copper 65 per cent, tin 1 per cent, lead 2 per cent, zinc 32 per cent. Pouring temperature light 2100, medium 2000, heavy 1900 degrees Fahr. Deoxidizer 2 ounces aluminum per 100 pounds metal except where castings are pressure tested. Tensile strength 30,000 and yield point 13,000 pounds per square inch, elongation 25 and reduction in area 25 per cent, shrinkage 3/16-inch per foot, brinell 45. Sand permeability 20, strength 7 pounds, grain 150, clay content 15 per cent, moisture 6 per cent.

From a paper presented by W. B. George at the third annual foundry conference Wisconsin Chapter A. F. A. Milwaukee.

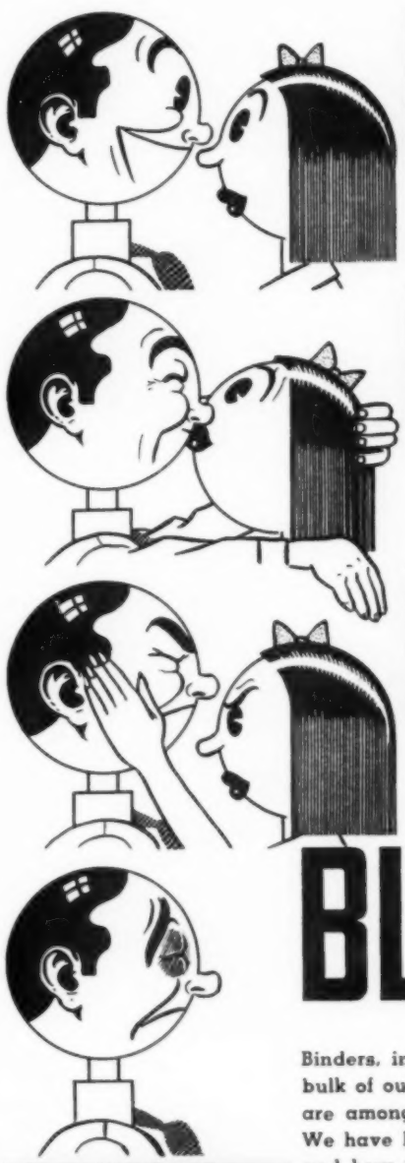
A.F.A. Board Elects Staff Officers

The board of directors of the American Foundrymen's association at its annual meeting voted to combine the offices of executive vice president, treasurer, and manager of exhibits, and elected C. E. Hoyt to those offices. The board also combined the offices of secretary and technical secretary. Robert E. Kennedy was re-elected secretary and Norman F. Hindle, formerly technical secretary, was elected assistant secretary. The secretary and assistant secretary will continue the direction and supervision of technical committee activities and program developments, in addition to performing other duties. E. O. Jones was re-elected director of safety and hygiene, and in addition to supervising the work of that section, will continue membership promotion, the Founders Mutual Casualty Co., and other activities. Jennie Heininga was re-elected assistant treasurer, and as office manager, will have charge of the association and chapter membership records.

The board of directors, acting upon recommendations submitted in the report of Robert E. Kennedy, secretary, approved the appointment of a board committee to co-ordinate and control the work of the divisions and general interest technical committees, controlling publications and publication policies, and reviewing and recommending research projects and appropriations. The committee will be known as the technical activities correlation committee, and President Shannon has appointed director Hyman Bornstein as chairman and directors Fred Walls, and C. R. Culling as members.

A report of the results of the membership drive in chapter territories was presented showing that the Birmingham District chapter won through the addition of 53 new members, or an increase of 33.5 per cent. Northeastern Ohio chapter was second with an 12.80 per cent. Quad-City third with 12.62 per cent and Wisconsin fourth with 12.58 per cent.

The refractories investigation in the Mellon institute on the multiple industrial fellowship of the American Refractories institute is described in a 20-page booklet recently published by the institute.



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CASTS LINING FOR GIANT TIRE MOLD

(*Continued from page* 51)

Steel Co., Cleveland. The aluminum tread rings which fit inside the castings, 106 inches in diameter and among the largest castings ever attempted in this metal, were molded and cast by the John Harsch Bronze & Foundry Co., Cleveland.

The pattern with the elaborate tread design was formed in plaster instead of wood. A space was cleared on the foundry floor, a spindle set up in the usual manner and a plaster dome was built up and swept to the shape of the inside of the pattern, or to put it another way, to the shape of the mound of sand forming the inside of the mold, as shown in Fig. 1, minus the indentations. The usual pattern shrinkage allowance 3/16-inch per foot was provided. Incidentally it is interesting to note that the casting contracted exactly as anticipated.

Tread design was uniform, made up of 29 similar units. One blank slab, a 1/29th section of the pattern was cast against the dome. A suitable wood frame was set up and the thick plaster was applied by hand. Surplus plaster was removed with a short straightedge riding on the upper edges of the frame. Several pieces of steel rods were laid in the plaster for reinforcement. Clear plaster was laid on at the face, but the remainder of the space was filled with a mixture of plaster and fiber. The fiber provides strength and rigidity and corresponds to the hair used in architectural plaster mixtures. The facing plaster in this instance was thicker than usual since the tread indentations had to be formed later. After the plaster had set, the section slab was removed, laid on its back and the grooves for the treads were carved by hand. This finished slab then was used as a pattern for reproducing the remaining 28 sections. It was placed inside a frame and a plaster obverse, corresponding to a corebox, was built around it. Later the 28 sections were formed with plaster in this frame.

Reinforce Frame With Rods

The sections were assembled in place around the mound on the floor and then the retaining plaster ring shown in Fig. 2 was built around them. This frame was reinforced with stiff steel rods circumferentially and vertically. Additional rods on the outside were attached to a flat combination steel and wood frame. The plaster in this retaining ring was thrown on by hand after the manner practiced by loam molders. The completed assembly was rolled over and set on a level floor. The inside was rammed full of sand, a mixture of half and half new and old Albany No. 1. The drag then was set in place and rammed full of sand, after which pattern and drag were rolled over as a unit and placed on the floor as shown in Fig. 1. The retaining ring was removed leaving the sectional pattern in place on the mound of sand in the center. After the drag joint was cleaned and repaired to the upper level of the flange, the flask cheek was lowered into place and rammed full of sand in the usual manner. Four sprues were set up, one near each corner. These sprues also projected through the cope, and an additional sprue was placed in the center of the inside ring.

The cope was rammed, lifted off, finished and set down on blocks as shown in Fig. 3. Three runner boxes were built, one to be filled with metal at each end of the flask, and the third to be filled at one side. Two riser heads were set up near each side of the cope.

The cheek was lifted by two pairs of chains suspended from opposite

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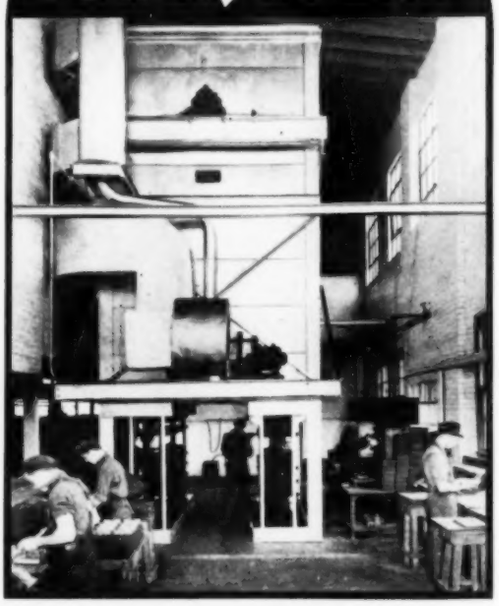

Coleman Tower Oven at Decatur Casting Co., Decatur, Ind.

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ends of a beam hanging from a crane hook. The beam prevented the chains from pulling in and squeezing the sides of the flask. Position, size and shape of the runners and gates may be noted in Fig. 1. Rapid entrance of the metal was one of the main essentials, first on account of the great area to be covered and second on account of the great number of internal chills designed to prevent draws, shrinks and porosity. Metal in the tread area is 3½ inches thick and only approximately half that thickness in the remainder of the casting. To an experienced foundryman this feature introduced a serious hazard. In this instance the hazard was eliminated by placing a continuous line of precast aluminum chill castings between the inside and outside walls of the entire mold. Each chill was cast in three sections, as shown in the center of Fig. 4. The section to the left was provided with two sharp steel prongs for insertion in the sand at the bottom of the flange. The section to the right for a position higher in the mold was held by chaplets. The third section at the center and above the others was suspended from the cope. The chills received no special treatment outside of being thoroughly sandblasted and then kept warm and dry in an oven until the time came to place them in the mold.

Melt Large Volume of Metal

Practically the entire melting capacity of the shop was utilized in melting the metal for each of the 3000-pound castings. Furnaces include a battery of eight 300-pound crucible furnaces, two 300-pound noncrucible furnaces, three 1000-pound noncrucible and two 2000-pound noncrucible furnaces, a total capacity of 10,000 pounds. These weights are for brass or bronze. The weight of an equivalent volume of aluminum is approximately 3300 pounds.

Pouring the metal was simplified to a considerable extent by providing exceptionally large runner basins. The sprues were plugged and the basins were filled with metal. Then the plugs were removed and the metal entered the mold quietly and rapidly. Metal from a small ladle hanging on the crane entered the center sprue when an estimate indicated that the mold was approximately half filled. When the feeding risers were filled, the remaining metal in the runner basins was tapped through small openings between the bottom edge of the runner box and the top edge of the cope.

Metal for the castings was the standard alloy No. 43 made by the Aluminum Co. of America. In addition to other commendable properties this alloy flows freely and conforms to the following analysis: Silicon 4.5 to 6.00 per cent, iron 0.8 per cent, manganese 0.2 per cent, copper 0.6 per cent, zinc 0.2 per cent, magnesium trace and the remainder aluminum. Sand cast test bars show a tensile strength of 17,000 pounds per square inch and a minimum elongation of 3.00 per cent in 2 inches.

Book Review

Materials Handbook of Nonferrous Metals (Werkstoffhandbuch Nichteisenmetalle), edited by the Deutschen Gesellschaft fur Metallkunde, published by VDI-Verlag, Berlin, Germany.

This volume, which is written in German, is the third revised and enlarged edition. It deals with both wrought and cast copper, brass, bronze and red brass. Interesting information on preparation, physical and mechanical properties, and applications are made in the book's 146 pages containing 88 illustrations.

Chain Belt Co. has moved its Minneapolis offices from 808 LaSalle avenue to 1645 Hennepin avenue, where larger space and increased service facilities are available. R. X. Raymond is Minneapolis manager.

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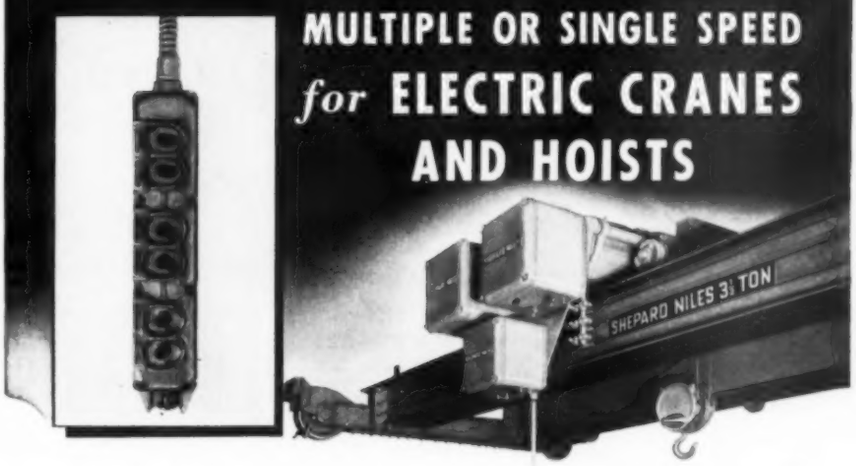

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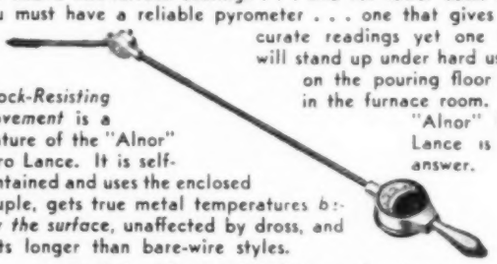

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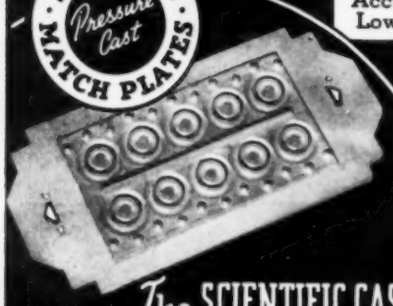

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